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Marine Fisheries Abstracts

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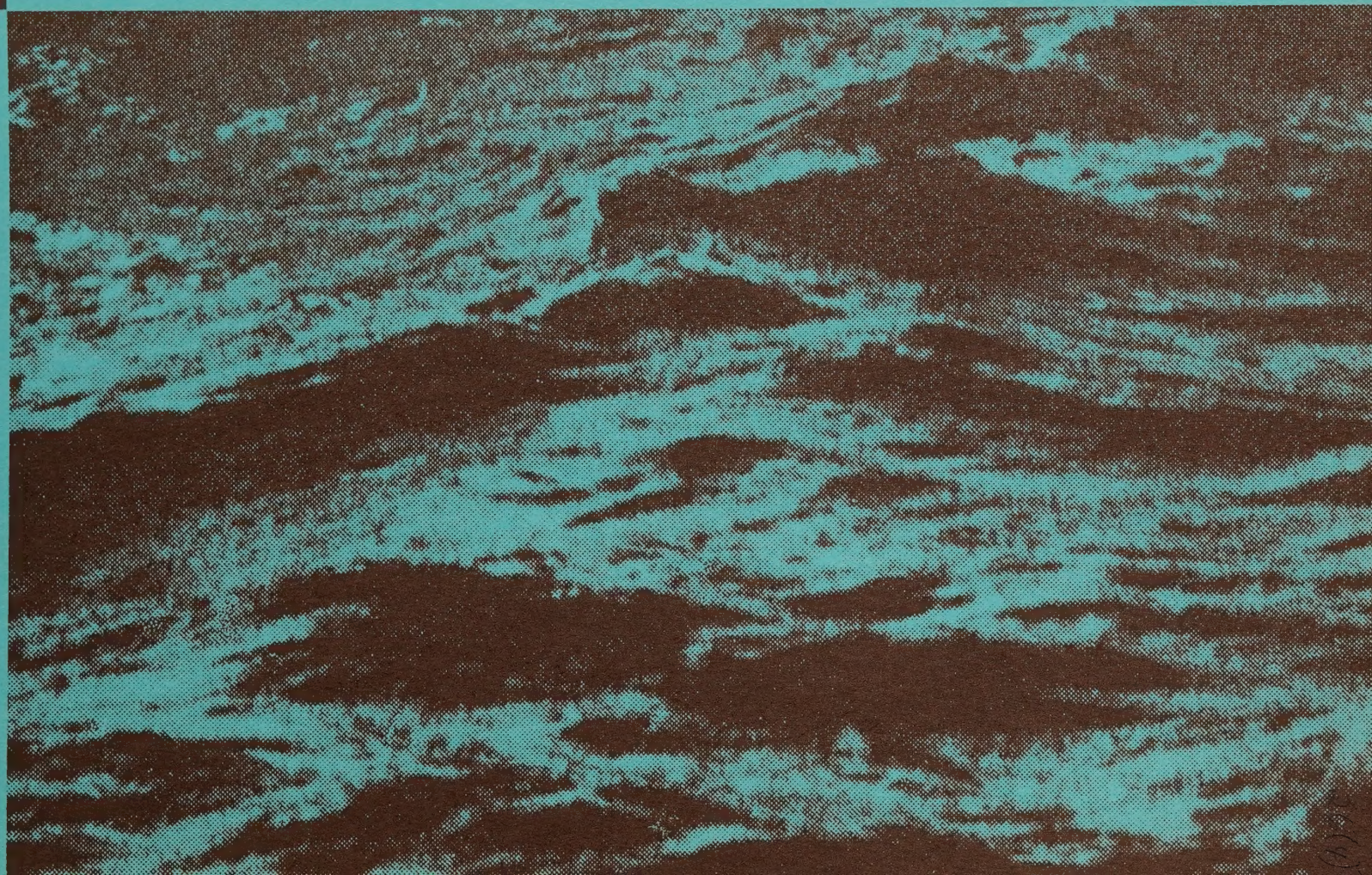

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

For sale by the Superintendent of Documents, U.S. Government Printing Office Washington, D.C. 20402 - Subscription price: $6.50 per year, ($1.75 additional for foreign mailing). Single copy 65 cents.

0.35 BIOCONVERSION OF THE DIETARY BRASSICASTEROL TO CHOLESTEROL IN ARTEMIA SALINA

Teshima, Shin-ichi, and Akio Kanazawa (Faculty of Fisheries, University of Kagoshima, 470 Shimoarata-cho, Kagoshima, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1305-1310 (Nov. 1972)

Earlier work indicated that insects and marine crustaceans probably lack the ability to synthesize sterols and that their sterols originate from exogenous sources (such as their diet). However, in previous papers the authors reported that Artemia salina (common brine shrimp) converts the dietary ergosterol and 24-methylcholesterol to cholesterol. Also, the senior author reported earlier that the prawn Penaeus japonicus and the crab Portunus trituberculatus are able to convert β-sitosterol and ergosterol, respectively, to cholesterol. These findings tend to suggest that marine crustaceans probably do have the enzyme systems to convert C_{28}- and C_{29}-sterols to cholesterol. In this paper, the bioconversion of brassicasterol to cholesterol in Artemia salina, is described. A. salina were fed the diatom Cyclotella nana, containing ^{14}C-labeled brassicasterol.

The sterols were then isolated from the organism. The isolated sterols subjected to gas-liquid chromatography showed the presence of one component corresponding to cholesterol of relatively high radioactivity. After confirmatory tests, the authors, concluded that A. salina is capable of converting dietary brassicasterol to cholesterol.

[4 figures, 3 tables, 15 references] FTP

0.36 METABOLIC RESPONSES OF THE FRESH-WATER BIVALVE, PLEUROBEMA COCCINEUM (CONRAD), TO ANAEROBIC CONDITIONS

Badman, David G., and Sandra L. Chin (Dept. of Biology, Kalamazoo College, Kalamazoo, MI 49001)
Comparative Biochemistry and Physiology 44, No. 1B, 27-32 (Jan. 15, 1973)

Earlier work has indicated that bivalves can withstand lack of oxygen for long periods and, in this condition, they undergo a rapid decrease in glycogen with production of large amounts of CO_2. Most of the bivalves in these experiments came from intertidal areas. To study the responses of fresh-water bivalves to anaerobic conditions, clams were taken from the Kalamazoo River and acclimated in aquaria containing spring water at 20° C., without feeding, for 1 week. Oxygen consumption of these clams was measured. The same clams were then held in air for 5 days, and oxygen consumption was measured again. The oxygen consumption of whole clams was too variable for reliable results. However, the oxygen consumption of clams held in air (anaerobic condition) was slightly higher than normal.

Gill tissues removed from well oxygenated clams and from clams held under anaerobic conditions for 5 days were measured for oxygen consumption. The results show that the oxygen consumption of gill tissue from clams subjected to anaerobic conditions is higher than gill tissue from clams held in water (aerated).

Whole clams subjected to aerobic and anaerobic conditions were tested for glucose and glycogen content. Clams exposed to zero oxygen conditions contained less glycogen than oxygenated clams for the first 24 to 48 hr.; however, there

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0.38 PROPERTIES OF FISH GASTRIC HYALURONIDASE

Kitamikado, Manabu, and Hiroshi Yamamoto (Lab. Fish. Tech., Fac. Agr., Kyushu Univ., Fukuoka, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1275-1280 (Nov. 1972)

In earlier work, the authors found hyaluronidase in the stomach of certain fish; the enzyme acts as a N-acetylhexosaminidase. Because of an interest in its origin, they investigated the properties of the enzyme. An electrophoretically homogeneous enzyme was prepared from the gastric mucosa of the mackerel Scomber japonicus to determine its physical and chemical properties.

Fish gastric hyaluronidase shows optimum activity at pH 4.8; optimum activity of the enzyme shifted to pH 2.8 when NaCl was present at the 0.15 M level. NaCl, KCl, and $MgCl_2$ enhanced the activity of the enzyme; the enhancement was attributed to the presence of the ion Cl^-. The ion Zn^{++} (at 10^{-4} M) also enhanced the activity of the enzyme; Ag^+ and Cu^{++} had no appreciable effect on the activity; and Hg^{++} inhibited the activity. Under the conditions tested, the maximum activity was at 50° C. The Michaelis constant for the enzyme reaction was 0.5 mg. per milliliter. The molecular weight of hyaluronidase is about 56,000.

[8 figures, 3 tables, 17 references] FTP

0.4 (9.11) TEKTITE II. MEDICAL SUPERVISION OF THE SCIENTISTS IN THE SEA

Beckman, Edward L., and Elizabeth Miremont Smith (Marine Biomedical Institute, University of Texas Medical Branch, Galveston, Tex.)
Texas Reports on Biology and Medicine 30, No. 3 (Special Issue) (Fall 1972), 204 pp. (Published by the University of Texas Medical Branch, Galveston, TX 77550). Price not given.

Undersea exploration and research offer possibilities of: (1) a bolster to the fishing industry through the development of new equipment and technology; (2) a source (the sea floor) of ore, chemicals, and minerals; (3) the sea as a source of food and of fresh water; (4) use of submersible observation vehicles to aid in more exact weather forecasting; (5) the sea as source of pharmaceuticals; and (6) the undersea for tourism.

Conventional methods of working underwater have limitations; for example, a man working at a depth of 40 ft. or below of water for more than 4 hr. must undergo decompression procedures. Also, careful management of breathing mixtures and excursion depths is required. One primary purpose of the Tektite program was to demonstrate the superiority of working undersea as a resident rather than working in short terms from the seashore or from a diving platform. The Tektite programs consisted of a series of scientific missions in which the scientists remained in and worked from an underwater dwelling for extended periods.

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was no difference in glycogen levels between the two groups after 48 hr. Glucose levels were affected in a similar manner.

Clams in low, not zero, oxygen levels are not affected by such conditions. These results help to explain how the clam is unaffected by the low oxygen conditions of the Kalamazoo River in late summer when the temperatures are up to 34° C. Lactic acid is present in the clam after anaerobiosis but in insufficient quantities to account for the low levels of carbohydrate found.
[2 tables, 15 references] SW

0.36 (6.3) RESPIRATION AND RESISTANCE TO ANAEROBIOSIS OF FRESHWATER ALGAE

Dokulil, Martin (Pflanzenphysiol. Inst. Univ. Wien, Vienna, Austria)
Chemical Abstracts 77, No. 17, 111674g (Oct. 23, 1972)

0.4 (9.11)

This bulletin reports on the medical supervision of the scientists in the sea. It covers the following subject areas: Saturation Diving; Tektite I (history, objectives, ...); Evolution of Project Tektite II (objectives, ...); Medical Staff and Responsibilities; Psychological Monitoring; The Spectrum of Medical Supervision of the Aquanauts; Other Medical and Biological Objectives (training offered the physicians, testing and validating decompression schedules, ...); Tektite Logistics (the complex, the habitat, life support systems, dietary requirements, ...); Mission-by-Mission Experiences (daily routine, individual missions, ...); The Aborted 100-FSW (Minitat) Program; Decompression Tables; General Medical Observations; Some Preliminary Psychological Observations; Biochemical, Hematological, and Endocrine Studies; and Conclusions.

The 53 aquanauts involved in this study lived in the underwater habitat for periods of from 2 to 4 weeks without developing any significant medical problems. Apparently, there is no significant detrimental physiologic response to living at increased ambient pressure for such long periods. On the basis of the results, the previously established decompression procedures were modified. FTP

0.38 (8.59) STUDIES ON THIAMINASE I IN MARINE FISH--I. THIAMINASE IN ANCHOVY

Ishihara, Tadashi, and Masato Yasuda (Faculty of Fisheries, Nagasaki University, Nagasaki, Japan), and Hitoshi Morooka (Nagasaki Women's Junior College, Nagasaki)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1281-1287 (Nov. 1972) (In Japanese; figures, tables, and abstract in English)

In this study, the authors verified the presence of thiaminase in the anchovy Engraulis japonica. In addition, some properties and distribution were studied. The pH for optimum activity of the enzyme is 5.5. Its activity disappears when the enzyme is heated at 90° C. for 10 min. Enzyme activity is inhibited by p-chloromercuribenzoic acid, iodoacetamide, and monoiodoacetic acid; enzyme activity is recovered up to 85% of its original value in the presence of cysteine. The levels of thiaminase in the various parts of the anchovy, in decreasing order, are kidney (the level of thiaminase in this organ was particularly high), liver, pyloric caecum, intestine, stomach, and muscle. The level of enzyme activity in the anchovy is comparable to that in carp Cyplinus carpio. The enzyme is particularly activated by pyridine, but also by aniline and quinoline.
[8 figures, 4 tables, 18 references] FTP

0.5 (9.15) ISOLATION OF ALEUTIAN MINK DISEASE VIRUS BY AFFINITY CHROMATOGRAPHY

Kenyon, A. J. (Dept. of Pathology, University of Minnesota Medical School, Minneapolis, MN 55455), J. E. Gander, C. Lopez, and R. A. Good
Science 179, No. 4069, 187-189 (Jan. 12, 1973)

The virus causing the Aleutian disease of mink was isolated by affinity chromatography. Infective particles resembling picornaviruses were released by dissociation of the immunoadsorbent-virus complex with 0.75 molar sodium chloride and then with a glycine-hydrochloride gradient. Two different types of virus-antibody complexes were formed, one that is dissociated by sodium chloride and another that requires glycine-hydrochloride in addition to sodium chloride for release of the virus.
[2 figures, 1 table, 17 references] FTP

0.5 MICROBIAL CONVERSION OF MERCURY COMPOUNDS. II.

Yamada, Masaru, Kensuke Kurukawa, and Kenzo Tonomura (Gov. Ind. Res. Inst. Microbiol., Japan)
Chemical Abstracts 77, No. 17, 111311m (Oct. 23, 1972)

0.4 (1.86) THE EVOLUTION OF SEX PHEROMONE COMMUNICATION IN THE ARTHROPODA

Kittredge, J. S., and F. T. Takahashi (Div. of Neurosciences, City of Hope National Med. Center, Duarte, CA 91010)
Journal of Theoretical Biology 35, 467-471 (1972)

Considerations of the evolution of the biology and behavior of animals must acknowledge the improbability of the occurrence of two de novo events.

Chemical communication is thought to be the prime mode of communication in most animals. It is composed of two complex activities: (1) the biosynthesis, storage, and release of a substance; and (2) the reception and translation of this message into a behaviorial pattern. Both of these activities in the Arthropoda may be polygenic complexes. The probability of the simultaneous (de novo) occurrence of the two capabilities during the evolution of this group of animals is essentially zero.

The finding that crustecdysone, the molting hormone, is also the sex pheromone [a substance secreted by an animal that influences the behavior of other individuals in the same species] of some brachyuran crabs suggests an explanation for the appearance of two capabilities simultaneously. The authors suggest that the ancestors of the crabs, having evolved a steroid molting hormone, were equipped with the polygenic synthetic capacity to produce the steroid involved and the genetic information controlling the structure of the hormone receptor site on the target organs. The steroid possessed chemical specificity and limited solubility in aqueous systems; thus, these properties would promote high binding to receptor

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0.8 (2.3) APPLICATIONS OF PLATE AND SCRAPED SURFACE HEAT EXCHANGERS

Smith, R. W. (Dairy Dept., Alfa-Laval Co., Ltd., United Kingdom)
Food Manufacture 47, No. 10, 37-38, 40 (Oct. 1972)

Two basic processes of heat exchange are used: direct and indirect. In the direct process, steam is injected directly into the product to raise the temperature, and then the vapor is flashed off in a vacuum chamber. This method is used for low viscosity products. In the indirect heat exchanger a plate or tube wall separates the product from the heating or cooling medium. The indirect method is applied in all the following types: plate heat exchangers (PHE), closed tube heat exchangers (CTHE), and scraped surface heat exchangers (SSHE).

For high heat transfer rates turbulence is induced into the product to prevent static films forming on the heat transfer surfaces. In the PHE, turbulence is induced by patterns pressed into the surface of the plates. Pump pressure induces turbulence in the individual tubes of the CTHE. Because of inspection difficulties and sanitary problems CTHE is not used for processing foods. In the case of SSHE, turbulence is mechanically induced into the product by the action of a rotor carrying scraper blades.

PHEs are used for a wide range of low-viscosity liquid products and have the advantages of sanitary design, simple maintenance, and quick dismantling for inspection. In addition, if more capacity is required, more plates can be installed on a given piece of equipment. Moreover, a PHE can conserve heat by preheating incoming product with previously heated product which is flowing toward the cooling section. The PHE is limited to liquid products that do not contain particulate

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0.8 (2.3) HEAT TRANSFER AND HEAT EXCHANGERS

Darlington, R. (Research and Development Division, A.P.V. Co., Ltd., Crawley, Sussex, England)
Food Manufacture 47, No. 10,31, 33, 34 (Oct. 1972)

Heat exchange is an operation in the food industry that is frequently referred to either as cooking, baking, drying, evaporating, freezing, or sterilizing. To keep the cost of the heat exchange equipment to a minimum, the designer should aim for the highest value for the overall heat transfer coefficient (U), the lowest area available for heat transfer (in square meters) (A), and an optimum log mean temperature difference between the fluids (in °C.) (ΔT). These considerations are based on the general fundamental formula for heat transfer: $Q = (U)(A)(\Delta T)$, where Q = quantity of heat transferred in a given time.

Heat transfer in processing prevents microorganisms from causing deterioration: freezing slows or stops their activity; drying prevents growth; and sterilizing by heat kills. To prevent deleterious effects on the nutritional entities in the product, the process conditions should be defined very carefully relative to temperature.

In choosing equipment, four factors should be considered: hygiene, safety (of food products), accuracy of measurement, and reliability. Cleanliness of parts and accessibility for cleaning are necessary adjuncts to hygiene. To maintain safety of foods instrumentation is required so that malfunction of the processing can be recognized and the unacceptable product diverted from shipment to

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0.7 THE ALTERNATIVE USES OF FISH

Burgess, G. H. O. (Torry Research Station, Aberdeen, Scotland)
FAO Fisheries Reports, No. 117, 28 pp. (1971) (Food and Agricultural Organization of the United Nations, Rome, Italy)

The growing world deficit in protein supplies has increased interest in the utilization of unfamiliar species of fish. Although not always acceptable for direct human consumption, these fish, when processed, may yield an acceptable nutritious product. To place these conditions in perspective, a review of fish utilization and the requirements of fisheries is presented.

The world use of fresh and cured fish has been remarkably unchanged in the 5-year period, 1965 to 1969. In the same period, tonnage of frozen and canned fish has increased from 6.2 to 8.6 and 4.6 to 5.8 million, respectively. For purposes of reduction to industrial products, the world catch of fish over the same period has increased from 15.4 to 21.6 million tons.

The increased production has not resulted in an increase in protein available to the inhabitants of underdeveloped countries. Most of the catch taken off the coasts of these countries is exported to the developed countries.

The author believes that only through government intervention in the underdeveloped nations with assistance from developed countries can the fisheries, processing plants, and home markets be developed to make up the protein deficits that prevail. [3 tables, 95 references] SW

0.8 (2.3)

consumers. The accuracy and rapid response of temperature regulation is mandatory in maintaining the quality of product in high temperature short time (HTST), processing.

Steam-jacketed pans are used for small-scale batches. Plate heat exchangers are most useful for HTST processes. The plate machine can also incorporate heating, cooling, and heat recuperation. Tubular heat exchangers are suitable for fluids containing particles over 3×10^{-3} to 4×10^{-3} m. in diameter. Scraped surface heat exchangers are used for processing in which the product viscosity rises to a point that makes other heat exchangers of no benefit.

In evaporative food processing the hemisperical steam pan is best known for small batch operations at reduced atmospheric pressure. Film-type evaporators are used for liquids of low and medium viscosities. Film evaporators can be of either tubular or plate type and are capable of evaporating liquids of high viscosities at high temperatures and short contact times. The centrifugal evaporator rotates the product at high speed and can be used for HTST processing. Size of units is limited because of mechanical problems. Wiped film evaporators are basically vertical cylinders in which a wiper blade rotates. This unit is used to process very viscous materials and is generally used as a finisher.

In the near future, heat exchanger equipment is expected to be so advanced as to make present day sophisticated equipment appear to be antiquated.

[3 photographs] SW

1.013 PERUVIAN FISHERIES: CONSERVATION AND DEVELOPMENT
(1.21)

Smetherman, Bobbie B., and Robert M. Smetherman (California State University, Fresno, Calif.)

Economic Development and Cultural Change 21, No. 2, 338-351 (Jan. 1973)

This article is an examination of the effects of the fishmeal boom on the politics and economic development of Peru.

[2 tables, 49 references] FTP

0.4 (1.86)

site and facilitate detection at extreme dilution. With evolutionary externalization of the receptor site, the crabs were then capable of pheromone communication. The increased capacity of the males to detect receptive females provided the evolutionary pressure to fix this capability into the genome. Later evolutionary selection resulted in sexual dimorphism (having two different forms according to sex) and the detection capability became integrated into pre-existent mating behavior in the male. The dimorphism suggests that the organization of the pheromone receptor is induced by the sex hormones. At this stage the behavior response in the male to the pheromone was further altered. The pheromone must now function as a releaser for search and display behavior as well as a primer in the physiological change in the response in the male.

Duplication of these polygenic capacities provided the foundation of sex pheromone communication in the arthropoda which through mutation evolved into its sophisticated expression in modern insects.

[9 references] SW

0.8 (2.3)

matter. Particles can bridge across a narrow passage in the plate and may 'burn' on in a heating section. Also deposition on the surfaces will occur causing a reduction in heat transfer and increase in pressure drop. The SSHE can process highly viscous liquids, other liquids containing particles, and products that tend to deposit a film or form crystals on the surface. The scraper blade continually removes deposits--which could reduce heat exchange--thereby maintaining the rate of heat transfer. This type of heat exchanger is made of nickel with a hard chrome-plated finish on the product contact side. The SSHE is probably the most versatile of all types of heat exchangers; however, it is more expensive in terms of capital costs.

[3 photographs] SW

1.0152 (9.10) ECOLOGICAL AND MORPHOLOGICAL STUDY ON FISH-FAUNA FROM THE WATERS AROUND TAIWAN AND ITS ADJACENT ISLANDS. 2. NOTES ON SOME RARE CONTINENTAL SHELF FISHES AND DESCRIPTION OF TWO NEW SPECIES

Shen, Shin-Chieh, and Wai-Hwa Ting
Bulletin of the Institute of Zoology Academia Sinica 11, No. 1, 13-31 (June 1972) (Institute of Zoology, Academia Sinica, Nankang, Taipei, Taiwan, Republic of China)

Five rare species and two new species of deep-water fish caught from more than 100 meters deep by single trawling net in northeastern (Ta-chi) and southwestern (Tung-kong) continental shelf and Pescadore Islands are described. The five rare species are as follows: Deania aciculata (Garman), Etmopterus lucifer Jordan and Snyder, Ateleopus japonicus Bleeker, Gonorhyrchus abbreviatus Temminck & Schlegel, Xiphasia setifer Swainson. The two new species are Dalatias tachiensis n. sp. and Squatina formosa n. sp.
[7 figures, 2 tables, 28 references] FTP

2.05 BOTULISM

Anonymous
Journal of Food Science 37, No. 6, 985-988 (Nov.-Dec. 1972)

This article is a scientific status summary by the Institute of Food Technologists' Expert Panel on Food Safety and Nutrition. Botulism is a rare but a particularly notorious type of food poisoning, affecting the human nervous system. The article contains a brief discussion of the incidence of botulism, a description of the microorganism and the illness, the different types of Clostridium botulinum organisms involved, the distribution of the organism in nature, cause of the outbreaks, method of determining the cause of the outbreaks, growth of the microorganism, methods of commercial control, and procedures for keeping foods safe. Most outbreaks of botulism are caused by home-preserved (canned) foods. Commercial canning procedures are adequate, with a sufficient margin of safety, to destroy the spores of the organism. Foods can be kept safe from botulinum poisoning by use of good sanitation and of proper processing procedures. A list of U.S. Government documents on the methods of handling, freezing, and canning of foods in the home are given. The documents are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.
[7 references] FTP

1.88 (9.16) THE CULTIVATION OF THE EUROPEAN MUSSEL, MYTILUS EDULIS LINNAEUS

Mason, James (Marine Laboratory, Aberdeen, Scotland)
Oceanography and Marine Biology Annual Review 10, 437-460 (1972)

The total world harvest of mussels in 1969 was over 320,000 metric tons. The common European mussel M. edulis accounted for more than 80% of the total. The mussel is a luxury commodity, and the demand exceeds the supply.

The mussel is widely distributed in the boreal (northern) regions of the northern hemisphere, and it can survive wide ranges of environmental conditions. Fast growing mussels with plump flesh can be produced by suitable methods of cultivation. Salinity appears to influence growth rate. The best growth rates have been reported in waters of high salinity, at temperatures ranging between 10° and 20° C., and in light conditions described as half sunlight.

The enemies of mussels must be considered by cultivators and are either predators, competitors, or parasites. The chief predators are starfish and crabs. Competitors of mussels include barnacles, tube-worms, bryozoans (sea mosses), ascidians (sea squirts), sponges, and algae. The competition is for space and food. High concentration of mussels increases vulnerability to parasites. These include larval trematodes (flat worms or flukes) and a copepod (a minute crustacean) which make mussels unsuitable for market.

Mussels are cultivated on poles, or on the seabed, or on suspended ropes. There are two public health hazards associated with mussel cultivation: poisoning due to phytoplankton blooms (paralytic poisoning) and bacterial pollution. Both
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2.08 (2.00) CHANGES IN QUALITY OF CHANNEL CATFISH HELD ON ICE BEFORE AND AFTER PROCESSING

Heaton, E. K. (Dept. of Food Science, University of Georgia Agricultural Experiment Stations, Georgia Station, Experiment, GA 30212), Jimmy Page, and James W. Andrews (Skidaway Institute of Oceanography, Savannah, GA 31406), and T. S. Boggess, Jr.
Journal of Food Science 37, No. 6, 841-844 (Nov.-Dec. 1972)

Earlier work at the authors' laboratories revealed that the quality of market catfish varied considerably and that the quality might be related in part to the different handling and processing practices used. Three series of tests were carried out. The first series was designed to evaluate the effects on the quality of the meat of feeding the fish up to the day of harvesting and of withholding feed for 24 hr. before harvesting. In each of these two groups, 10 fish were processed and examined immediately, and a similar number was held for 6, 12, 24, 48, and 96 hr. before processing and examining.

In the second series, the effects of holding the whole fish on ice and at ambient temperature were examined. Fish from both the fasted and nonfasted lots were held in crushed ice for 0, 12, or 48 hr., then were held for 0, 4, or 8 hr. before dressing and testing.

In the third series, the effects of storing the dressed catfish directly in crushed ice (ice-pack) or packaged in plastic bags and then packed in crushed ice (chill-pack) were determined. The ice-pack and chill-pack dressed catfish were held in ice for 0, 2, 4, 8, 12, or 16 days before being examined. Quality
(over)

1.88

problems can be controlled by the self-cleansing characteristics of the mussel in clean water.

Mussel cultivation is a way of making better use of primary production of the sea. These sessile, bottom-dwelling filter-feeders, through their ability to filter food from water brought to them by currents from a much greater region than they actually occupy, often attain great productivity in areas of intensive cultivation.

Mussels are successfully cultivated on the coasts of southern and central Europe. Furthermore, experiments conducted in the inlets of the Scottish and Norwegian coasts have shown that mussels can be successfully grown there. Although mussels are abundant in North America, they are not considered a source of food. The prospects of continued expansion of mussel culture are good, but they will be grown for the more profitable end use as luxury food. As costs of production decrease, cultivation of mussels for improving substandard diets of underdeveloped countries will be feasible.
[9 figures, 114 references] SW

2.08 (2.00)

evaluations included percent loss in weight during thawing and cooking; subjective ratings for appearance, color, aroma, flavor, and texture; and shear press firmness measurement of the cooked fish.

Channel catfish changed in quality more during the first 48 hr. on ice than during the second 48 hr. (from 48 to 96 hr.); the catfish may be held on ice for up to 24 hr. before processing and still yield a highly satisfactory finished product. Panel ratings of the fish from fasted- and the fed-fish groups were not significantly different. The reduction in quality of channel catfish held at ambient temperature for 4 and 8 hr. was about equivalent to that of channel catfish held for 24 to 48 hr. in crushed ice. Dressed channel catfish retained acceptable quality when held in crushed ice for up to 12 days; those packaged in plastic bags and then held in crushed ice retained acceptable quality for 8 days.
[9 tables, 6 references] FTP

1.83 (9.10) ECOLOGY OF NEW ZEALAND ABALONES, HALIOTIS SPECIES (MOLLUSCA: GASTROPODA)

Poor, Gary C. B. (Fisheries and Wildlife Dept., Melbourne 3000, Australia)
New Zealand Journal of Marine and Freshwater Research 6, Nos. 1-2, 11-22 (Jun. 1972)

Abalones have been a basic food item in the orient since ancient times, and they are gaining appeal as a delicacy to western consumers. The genus Haliotis is distributed worldwide; New Zealand and adjoining islands have three species: H. iris (Martyn, 1784); H. australis (Gmelin, 1790); and H. virginea (Gmelin, 1790).

H. iris reaches a maximum size of about 170 mm., H. australis about 110 mm.; both are most abundant immediately below low-tide mark down to about 4 m. H. virginea reaches a maximum size of about 70 mm. and is most common in deeper water, about 27 m.

Examination of gut content of H. iris and australis indicated that they fed mainly on red algae at all times of the year, but feeding was heaviest in the winter. Brown algae is available on various coasts of the islands and is also used for food by both species of abalone. They prefer red algae to brown algae. Juvenile H. iris fed red algae for 6 months in the laboratory grew faster than those fed brown algae.
[1 figure, 4 tables, 29 references] SW

2.3 (2.8) PROCESS FOR THE MANUFACTURE OF FISH SOUP CONCENTRATE

Greguss, Akos, and Janos Engi (Szeged, Hungary); granted to Konzervipari Troszt, 19 Gubacsi u, Budapest IX, Hungary (pat.)
Canadian Patent 913,451
Patent Office Record (Canada) 100, No. 44, 4516 (Oct. 31, 1972)

Cooked fish is pulped, and the pulp is mixed with appropriate amounts of ground paprika, onion powder, and salt. FTP

2.3 BREADING APPARATUS

Harkey, C. N.; J. D. Jewell, Inc. (pat.)
U.S. Patent 3,703,382
Food Technology 27, No. 2, 89 (Feb. 1973)

This machine continuously applies a combination wet batter and dry breading to continuously moving pieces of food (including shrimp). FTP

2.1121 SHRIMP FISHING WITH TWIN TRAWLS
(1.85)(1.0116)
(1.0117)

Harrington, David L., Martin R. Bartlett, and James Higgins (Marine Extension Service, University of Georgia, Brunswick, Ga.)
Marine Extension Bulletin No. 1. Issued by the Georgia Sea Grant Program and the Marine Extension Center of the University of Georgia on Skidaway Island, P.O. Box 13687, Savannah, GA 31406 (1972), 10 pp.

Many shrimp boat fishermen in the Gulf of Mexico and off the southeastern United States have stopped using a single large trawl; instead, they use two smaller trawls, one each side of the boat. Two smaller trawls with a combined mouth opening of a given size are more productive than a single trawl with the same size opening. The improvement in fishing efficiency of the two smaller trawls is due to their lighter weight which reduces drag on the boat. Pulling less weight with reduced drag, the boat can go faster, and the nets can sweep more area in the time that a single large trawl is fished.

Another development has taken place in the shrimp fishery of this region. Instead of the two trawls being fished one on each side of the boat, two trawls (or twin trawls) are towed together on a single cable. Results of experimental shrimping with twin trawls indicate that they are more productive than previous methods of trawling.

A diagram of the rig viewed from above is shown in the figure. There are other diagrams in the article showing different sizes of sleds and a trolley

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2.14 AN ELECTRIC TRAWL SYSTEM FOR LOBSTERS

Saila, Saul B. (University of Rhode Island), and Cecil E. Williams
Marine Technology Society Journal 6, No. 5, 25-31 (Sept.-Oct. 1972)

Trawling for lobster off the New England coast, in contrast to pot fishing for lobster, has become a significant fishing industry. In 1970, 3.5 million pounds of lobster were taken by trawling off Rhode Island.

In trawling, the lower edge of the trawl is protected from damage by various forms of steel and rubber rollers. Lobsters must pass over the rollers before entering the trawl. Any device that could induce the lobster to leave the bottom just in front of the mouth of the trawl should increase the efficiency of trawling.

Problems involving a large power supply, complex equipment design, and high costs have kept the application of electric trawling at a low level despite the increased fishing efficiency it could provide. The authors have developed an electric trawl system which has overcome some of the problems.

The basic electric trawl system consists of an electronic pulse generator and a metallic electrode array towed in front of the net by a rope attached to the wing ends of the footrope. Connections were embedded in epoxy resin. An approximate 2-ft. horizontal space was maintained between electrodes, and opposite electrical polarity was applied to each successive electrode. The electrodes dragged the bottom during trawling operations as indicated by their scoured surfaces.

Tests were conducted to compare standard trawl, standard trawl with unenergized electrodes, and standard trawl with energized electrodes relative to

(over)

2.119 IMPROVING SAFETY OF WORK ON THE WORKING DECKS OF FISHING TRAWLERS [BEZPIECZEŃSTWO PRACY NA POKŁADACH ROBOCZYCH TRAWLERÓW RYBACKICH I MOZLIWOŚCI JEGO POPRAWIENIA]

Wójcik, T.
Budownictwo Okrętowe No. 11, 377-381 (1971) (In Polish)
Polish Technical and Economic Abstracts NR2(86), 107 (1972) [Published by Centrum Informacji Naukowej Technicznej i Ekonomicznej, Warzawa, Al. Niepodległości 186, Poland]

The discussion concerns the safety of fishermen working on deck relative to breakage of the trawl warp (on stern trawlers). The report also has a discussion on the advantages of an underdeck fish processing room and the mechanization of fish processing.
[6 figures]

FTP

2.3 SHRIMP PROCESSING

Jonsson, G. (pat.)
British Patent 1,288,422
Food Technology 27, No. 2, 86 (Feb. 1973)

This apparatus is used to separate shrimp meat from the shell. FTP

2.3 SCALLOP EVISCERATION

Bunnell, C. M. (pat.)
U.S. Patent 3,703,022
Food Technology 27, No. 2, 86 (Feb. 1973)

This apparatus is designed to improve the efficiency of eviscerating scallops.
FTP

2.1471 (0.8) STUDIES ON APPROXIMATE FORMULAS FOR TENSION AND CONFIGURATION OF THE TOWING ROPE--III. METHOD OF APPROXIMATION OF THREE DIMENSIONAL PROBLEMS. IV. METHOD OF CALCULATION OF THREE DIMENSIONAL PROBLEMS

Miyazaki, Yoshio (Tokyo University Fisheries, Minato-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, Part III, 1215-1222; Part IV, 1223-1228 (Nov. 1972) (In Japanese; figures and abstract in English)

In these papers methods are described on how to calculate the tension at the warp of a two-boat trawl and to determine the configuration of the towing rope. In Part III an approximate calculation is described. Part IV gives a practical simplified method of calculation.
[Part III, 5 figures, 3 references; Part IV, 5 figures, 10 references] FTP

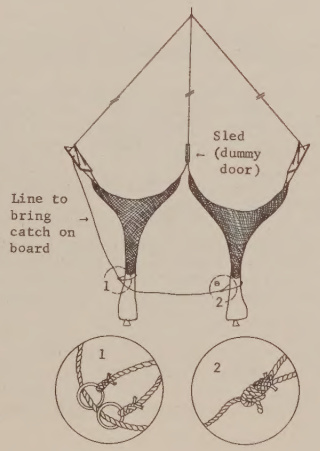
2.43 LOBSTER PACKAGE

Bowerman, Walter V. (Kingston, Ontario, Canada); granted to Du Pont of Canada Ltd., Montreal, Quebec, Canada (pat.)
Canadian Patent 912,904
Patent Office Record (Canada) 100, No. 43, 4414 (Oct. 24, 1972)

The lobster is packed in a pouch made of thermoplastic material. The freshly killed lobster is packed in the pouch, then the pouch is drawn snugly about the lobster by heat tempering while evacuating the air. FTP

2.1121 (1.85)(1.0116)(1.0117)

block system that is used to facilitate the handling of doors. Twenty-eight photographs in the article illustrate the operations of putting the doors overboard and retrieving them.
[33 figures]



SW

2.14

yield of crustacea and fishes. The results indicated the yields of lobster with this standard trawl were lowest; with standard trawl and unenergized electrodes the yields were better; and yields were best with standard trawl and energized electrodes. The data for crab yields were similar. The results of trawling for flatfishes were opposite those obtained for crustacea. The highest yields were from standard trawl, and the lowest yields were from standard trawl with energized electrodes. The authors concluded that the energized electrodes evoked an avoidance response in the fish.

Application of the electrode array will permit use of lighter trawl gear which does not dig into the bottom as much as conventional lobster trawling gear. This change should result in capturing more lobsters in better condition.
[5 figures, 6 tables, 13 references] SW

2.1127 POLY(VINYL ALCOHOL) GELS

Inoue, Taisei (Kuraray Co., Ltd.) (pat.)
German Offen. (Patent) 2,146,129 (May 10, 1972)
Chemical Abstracts 77, No. 10, 62982v (Sept. 4, 1972)

3.12 (2.9) NITRITES, NITRATES, AND NITROSAMINES IN FOOD -- A DILEMMA

Anonymous
Journal of Food Science 37, No. 6, 989-992 (Nov.-Dec. 1972)

This article is a scientific status summary by the Institute of Food Technologists' Panel on Food Safety and Nutrition. Nitrosamines can be formed in food products from a reaction between nitrites and certain amines. Some of the nitrosamines are carcinogenic. Nitrite and nitrate are used in meat, some fish, and certain cheeses. Nitrites occur naturally in some foods; the amines occur naturally in foods as breakdown products from the precursors present. Certain cured meat products, such as those that are pasteurized and require post-processing refrigeration, could not be manufactured without nitrite. The nitrite in these foods (at a minimal level of 150 p.p.m.) inhibits the germination of spores of Clostridium botulinum. The dilemma that arises is, Should we prohibit the use of nitrite in human food? shall we limit the levels of use? or shall we conclude that enough data is not available to reach a reasonable decision and push vigorously to obtain more information? The article states that many scientists take the position that more data should be acquired quickly so that a sensible, considered judgment can be made.
[15 references] FTP

3.33 AN IMPROVED PRECOOK PROCESS FOR BLUE CRAB (CALLINECTES SAPIDUS)

Tinker, Burton L., and Robert J. Learson (National Marine Fisheries Service, Atlantic Fishery Products Technology Center, Gloucester, MA 01930)
Chesapeake Science 13, No. 4, 331-333 (Dec. 1972)

Precooking is a necessary first step in the processing of blue crab to reduce bacterial count, facilitate removal of meat, and provide the characteristic crabmeat odor and flavor. Cooking crabs in steam or boiling water at 212° F. for 10 to 15 min. is common practice in most crabmeat processing plants. Blue crab meat is sensitive to heat, and biochemical changes due to cooking damage the product in color, texture, and reduced yield. Studies were made to find a process that would lessen the damage and provide a better quality product. Live crabs were placed in water containing 200 p.p.m. chlorine for 30 min. Two methods of cooking were used: steam at 212° F. for 15 min. and steam at 212° F. for 8 min.

Results of depuration in chlorine water indicated that bacterial count in crab meat had been reduced over 99%. Crabs subjected to steam at 212° F. for 8 min. after depuration had bacterial counts of less than 100,000 (bacteria per gram of meat) which is sufficient to meet public health standards. In addition, crabs treated in this manner gave a greater yield of meat which had better organoleptic quality than crab meat precooked for the longer period of time.
[4 tables, 5 references] SW

3.15 (1.85) EXTENDING THE SHELF LIFE OF BROWN SHRIMPS (CRANGON VULGARIS FABR.) BY GAMMA IRRADIATION

Vyncke, W., and D. Declerck (Ministry of Agriculture, Fisheries Research Station, Stadhuis, B-8400 Ostend, Belgium)
Lebensm.-Wiss. u. Technol. 5, No. 5, 151-154 (1972)

The brown shrimp is an important and expensive food item in Western Europe. Because it is highly perishable in the chilled state an attempt was made to extend its keeping quality by gamma irradiation. The fresh shrimp were cooked at sea in the usual manner (6 to 10 min. in boiling [?] brine), packed in paper bags, then wrapped in polyvinylchloride stretch film before irradiation. The packaged shrimp were irradiated at doses of 0.05, 0.1, 0.2, 0.3, and 0.5 Mrad. After irradiation, the shrimp were stored at 0° C. and samples were examined at regular intervals of storage. Quality of the shrimp was determined by organoleptic tests and by objective tests of total volatile basic nitrogen, trimethylamine, dimethylamine, ammonia, volatile acids, volatile reducing substances, redox potential, α-amino nitrogen, hypoxanthine, total bacterial count, psychrophilic bacteria, and anaerobic bacteria.

The results indicated that the shelf life at 0° C. of brown shrimp could be extended by at least 12 days by gamma irradiation; optimal dose was 0.1 Mrad. When irradiation doses of 0.3 Mrad or higher were used, the shrimp had unacceptable off-flavors. The total volatile basic nitrogen and ammonia values appeared to be reliable indices of spoilage of the irradiated shrimp.
[3 figures, 35 references] FTP

3.12 METHOD OF PREPARING FRESH UNCURED MEAT PRODUCTS

Oscar Mayer & Co. (J. C. Bard and F. C. Olson) (pat.)
U.S. Patent 3,679,434
Natn. Provis. 167, No. 11, 29 (1972)
Food R.A. Abstracts 26, No. 1, Abstract No. 341, 52 (Jan. 1973)

Slices or chunks of raw meat weighing approximately 8 ounces and a minimum thickness of approximately one inch are injected with a solution of edible polyphosphate salt, mechanically worked and the resulting exudate covered pieces are pressed together to give portions of predetermined size, shape and weight. It is said that by injecting the polyphosphate solution rather than coating the meat with it, rancidity development in the cooked meat product is retarded. Reprinted

3.15 (3.63) DEHYDRO-IRRADIATION PROCESS FOR WHITE POMFRET (STROMATEUS CINEREUS): SYNERGISTIC EFFECTS OF BLANCHING WITH PRESERVATIVES, PARTIAL DEHYDRATION AND LOW DOSE IRRADIATION

Agarwal, S. R., U. S. Kumta, and A. Sreenivasan (Biochemistry & Food Technology Div., Bhabha Atomic Research Center, Bombay 85, India)
Journal of Food Science 37, No. 6, 837-840 (Nov.-Dec. 1972)

In India the white pomfret is mainly consumed fresh, but in seasons when high landings occur the fish is preserved by freezing. The pomfret is a medium fat content (5 to 8%) fish, and it is susceptible to oxidative changes during frozen storage. As a result, it readily becomes rancid and discolored. Earlier work with shrimp has demonstrated the beneficial preservative effects of a combination treatment with sorbic acid, drying to 40% moisture content, and irradiation at 0.25 Mrad. In the present work, the authors attempted to improve the keeping quality of white pomfret fillets at ambient temperatures by a combination treatment of blanching, addition of preservative, dehydrating to 35 to 40% moisture content, packaging, and irradiation. In this process, the fillets of white pomfret were heated in boiling brine (20% salt) containing 0.1% propyl paraben (or p-hydroxybenzoic acid) for 5 min., partially dried in air to a moisture content of from 35 to 40%, packaged under nitrogen atmosphere in pouches of 4-ply laminated paper/low density polyethylene/aluminum foil/ low density polyethylene, and then irradiated at 0.5 Mrad. The treated white pomfret fillets kept in satisfactory condition for 4 months at ambient temperature (quality evaluations were made in terms of bacteria and mold counts; trimethylamine and total volatile base levels; carbonyl acid 2-thiobarbituric acid values; appearance; and organoleptic scores).
[6 figures, 2 tables, 27 references] FTP

3.63 HERRING PROCESSING

Halstensen, H., and H. Hov (pat.)
British Patent 1,228,312
Food Technology 27, No. 2, 86 (Feb. 1973)

Fish are preserved in a brine containing enzyme-absorbing wood shavings. FTP

3.27 THAWING OF FROZEN FOODSTUFFS

Everington, D. W.
Chemy Ind., No. 35, 973-979 (1971)
BFMIRA Abstracts 25, No. 1, Abstract No. 236, 48 (Jan. 1972)

Thermal methods, which are dependent upon the thermal conductivity and thermal diffusity of the foodstuff, and methods dependent upon the electrical properties of the foodstuffs such as dielectric constant and specific resistance, are described and discussed with reference to the physics of thawing. Particular attention is paid to the recently developed vacuum heat thawing method and the results of pilot plant tests using fish, meat and fruit are reported. Other systems discussed are water thawing, air thawing, dielectric thawing and electrical resistance thawing. Cost figures are given which show that vacuum heat thawing compares favourably with other methods of thawing in terms of capital and running costs. In addition, the equipment employed in vacuum heat thawing is more easily cleaned than equipment used in methods such as air thawing, consequently the costs of stoppages for cleaning are considerably lower. C.C.E. Reprinted

3.12 FISH PROTEIN TREATMENT

Haarman & Reimer G.m.b.H. (pat.)
Japanese Patent 72/39705
Food Technology 27, No. 2, 86 (Feb. 1973)

Pieces of fresh fish are coated with a mixture consisting of a major proportion of a di- or triglyceride and minor amount of a monoglyceride of paraffinic or olefinic carboxylic acid having 8 to 24 carbon atoms. FTP

3.33 FISH CANNING APPARATUS

Mencacci, S. A.; International Machinery Corp., S.A. (pat.)
U.S. Patent 3,700,386
Food Technology 27, No. 2, 86 (Feb. 1973)

This can-filling equipment for fish includes a conveyor that advances fish fillets past a rotary cutter (which cuts fish into segments), and then advances the fish segments into a compression chamber. FTP

3.338 STORAGE TESTS WITH FISH PRODUCTS IN CHROMIUM-AND TIN-PLATED CANS

Hottenroth, Beatrix (Inst. Lebensmitteltechnol. Verpack., Tech. Univ. Muenchen, Munich, Germany)
Chemical Abstracts 77, No. 17, 112626e (Oct. 23, 1972)

3.12 (6.54) FISH PASTE PRODUCTS

Matsumoto, J. (pat.)
Japanese Patent 72/31020
Food Technology 27, No. 2, 86 (Feb. 1973)

Carboxylic acids and polyalcohols are added to fish paste products to prevent their denaturation during frozen storage. FTP

4.11 A SIMPLE, RAPID METHOD TO PROCESS AND ASSAY FATTY ACIDS AND ALCOHOLS BY GAS CHROMATOGRAPHY

Bricknell, Kenneth S., and Sydney M. Finegold (Infectious Disease Section, Wadsworth Hospital Veterans Administration Center, and the Dept. of Medicine, U.C.L.A. School of Medicine, Los Angeles, Calif.)
Analytical Biochemistry 51, No. 1, 23-31 (Jan. 1973)

Current procedures for preparation and assay by gas chromatography of short chain, volatile fatty acids and other metabolites of bacterial activity are time consuming. Poor recovery of isolates using the preparatory procedures has also been reported.

A simple, rapid method for direct qualitative and quantitative determination of metabolite was developed; in addition, a large number of samples can be assayed by the method in a minimum time. Samples to be assayed are acidified to about pH 2.0, allowed to stand at room temperature for 30 min., and centrifuged at 2,000 r.p.m. for 10 min. The supernatants are transferred to clean tubes for immediate assay or capped and stored at 4° C. for future assay.

A gas chromatograph with a thermal conductivity detector (TCD), and another gas chromatograph with a flame ionization detector (FID) were connected to one recorder. An electronic digital integrator quantified the peak signals from the FID. A spiral column 6 ft. long and 1/4 in. outside diameter (o.d.) packed with Resoflex was used with the TCD; a stainless-steel spiral column 6 ft. long and 1/8 in. o.d. by 0.093 in. ID packed with FFAP (a product of a reaction between Carbowax 20M and 2-nitroteraphthalic acid) on Porapak Q, 80-100 mesh, was used with the FID.

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4.13 STEROLS OF STARFISHES--II. THE PRESENCE OF CHOLESTANOL, $\Delta^{7.22}$-CHOLESTADIENOL AND A NEW C_{26} STEROL

Matsuno, Takao, Seiichi Nagata, and Keizo Hashimoto (Kyoto College of Pharmacy, Yamashina, Higashiyamaku, Kyoto, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1261-1265 (Nov. 1972) (In Japanese; figures, table, and abstract in English)

In an earlier paper in this same journal [38, 144-147 (1972)], the authors reported the sterol constituents of six species of starfish. Δ^{7}-Cholestenol was the major sterol constituent; other sterols present were $\Delta^{7.22}$-ergostadienol, $\Delta^{7.22}$-stigmastadienol, Δ^{7}-stigmastenol, and the C_{28} sterol, stellastenol. The present paper reports on the identification of two sterols that were not identified in the previous study. These two sterols turned out to be cholestanol and $\Delta^{7.22}$-cholestadienol. Also, another sterol appearing in all six species of starfish was tentatively identified as 24-nor-$\Delta^{7.22}$-cholestadienol.
[4 figures, 1 table, 8 references]

FTP

4.13 (8.53) COMPARATIVE STUDY ON THE STEROL COMPOSITION OF MARINE MOLLUSKS

Teshima, Shin-ichi, and Akio Kanazawa (Laboratory of Fisheries Chemistry, Faculty of Fisheries, University of Kagoshima, 470 Shimoarata-cho, Kagoshima, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1299-1304 (Nov. 1972)

To advance knowledge of the comparative biochemistry of mollusks, the sterol composition of 21 species of mollusks was determined. The species represented three different classes, five different orders, and 13 different families. Data on the sterol content are shown in the table that follows.

Cholesterol was the main sterol of the gastropods. C_{27}-, and C_{28}-sterols were also detected in the Murex asianus, Cymatiidae sp., Charonia sauliae, and Conomurex luhuanus. The plecypods contained relatively small amounts (as compared to the gastropods) of cholesterol and showed a very complex sterol composition. Liolophura japonica (a primitive mollusk) contained 7-cholesterol (Δ^{7}-sterol).

(over)

4.5 POSSIBLE MECHANISMS OF AUTOXIDATIVE RANCIDITY

Loury, M. (Institut des Corps Gras, Paris, France)
Lipids 7, No. 10, 671-675 (Oct. 1972)

The purpose of this work was to try to obtain new information on the mechanisms of fat autoxidation. In order to obtain reliable results, the researcher used nearly pure fatty acids. The autoxidation of nonanal was also studied, because of the possibility that saturated aldehydes with 8 to 11 carbon atoms could be produced from scission or further changes of the primary oleic hydroperoxides.

The autoxidizable materials (oleic acid and nonanal) were dispensed as thin film on glass wool fibers. The glass wool containing the material was placed in a U-tube and purified air at constant temperature was passed through the tubes. The exiting air was passed through a dry-ice trap (-60° C.) to condense the volatile autoxidation products, and then was bubbled through aqueous barium hydroxide to detect and measure the carbon dioxide. The volatile compounds were fractionated and identified by chromatographic analysis.

The volatile products that were identified from autoxidized oleic acid and nonanal are shown in the table that follows.

(over)

4.13 THE COMPOSITION OF TRIGLYCERIDES AND CHOLESTERYL ESTERS IN SOME FISH OILS OF SALT, BRACKISH AND FRESH WATER ORYGINS [sic]

Ikekawa, Nobuo (Laboratory of Chemistry for Natural Products, Tokyo Institute of Technology, Ohokayama, Meguro-ku, Tokyo, Japan), Masami Matsui, Tamao Yoshida, and Takeshi Watanabe

Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1267-1274 (Nov. 1972)

The triglycerides and cholesteryl esters of oils from six species of fish were analyzed by gas chromatography after preliminary separation by thin-layer chromatography. The six species of fish were basking shark Acipenser mikadoi and sardine Sardinops melanosticta (salt-water fish), carp Cyprinus carpio, "yamame" a landlocked trout Oncorhynchus masou, and rainbow trout Salmo irideus (fresh-water fish), and the eel Anguilla japonica (brackish water fish). In general, the triglycerides in the fish oils contained an even number of carbon atoms (C-even), from C_{30} to C_{60}, and a small amount of triglycerides contained an odd number of carbon atoms (C-odd). The fresh-water fish oils contained mainly C-even triglycerides from C_{40} to C_{60}; the salt-water fish oils contained C-even triglycerides from C_{30} to C_{60}. Oils from the salt-water fish contained, characteristically, a predominance of the C-odd triglycerides over the C-even triglycerides below C_{45}; the C-even triglycerides were predominant above the C_{45}.

The cholesteryl esters in the oils of the fresh-water fish were mainly the C_{16} and C_{18} esters; those in the oils of the salt-water fish were mainly C_{14} to C_{26} esters.

[9 figures, 10 references] FTP

4.5

Product class	Products identified from oxidized: Oleic acid	Nonanal
n-Aldehydes	C_2; C_3; C_4; C_5; C_6; C_7; C_8; C_9; C_{10}	C_6; C_7; C_8; C_9
n-Alcohols	C_5; C_6; C_7; C_8	C_6; C_7; C_8
n-Alkylformates	C_2; C_3; C_4; C_5; C_6; C_8	C_6; C_7; C_8
n-Hydrocarbons	C_6; C_7; C_8	C_6; C_7; C_8

The recurrent reactions of autoxidation that give rise to volatile products are represented as follows:

$$\begin{array}{ccccccc} & & H\text{-}CO_2H & & H\text{-}CO_2H & & H\text{-}CO_2H \\ & & \uparrow & & \uparrow & & \uparrow \\ P \rightarrow & a_n & \rightarrow & a_{n-1} & \rightarrow & a_{n-2} & \rightarrow \text{(etc.)} \\ & \downarrow & & \downarrow & & \downarrow & \\ & A_n & & A_{n-1} & & A_{n-2} & \end{array}$$

where P = Hydroperoxide of oleic acid
A_n = Aldehyde of scission (octanal, nonanal, or decanal)
a_n; a_{n-1}; a_{n-2} = Aldehydes (lower homologs of a_n)
A_n; A_{n-1}; A_{n-2} = Acids
n = number of carbon atoms.

The author concludes that autoxidative rancidity is a succession of reactions between free radicals having varied life spans, and produces volatile products which are often offensive in taste and odor. He describes some possible reaction pathways.

[4 figures, 1 table, 18 references] FTP

4.11

After a warmup period of 15 to 20 min. the recorder and instruments were electrically balanced. An aliquot of standard mixture was injected into the TCD instrument. When retention time was confirmed, the recorder was switched to the FID and the standard mixture was injected into the FID system for confirmation.

Digital integrator quantitation was determined by using standard aqueous solutions of short chain fatty acids to establish a factor for each. The factor was used to calculate the concentration of a component found in a sample.

The method has proven to be reliable and accurate for the determination of metabolic end products in bacterial cultures and biological specimens. Total time for each test was about 20 min.

[3 figures, 1 table, 8 references] SW

4.13 (8.53)

Species of mollusk	Sterol content of the fresh marine mollusks: Lipids	Unsap. material	Sterols
	%	%	%
L. japonica	0.85	0.11	0.070
H. gurneri	1.27	0.87	0.091
C. nigrisquamata	4.50	0.19	0.116
C. nigrolineata	1.9	0.21	0.10
P. saccharina	3.0	0.20	0.13
M. labio	2.0	0.48	0.13
T. maximus	2.4	0.11	0.07
T. maculatus	2.3	0.38	0.20
A. haematragum	2.5	0.22	0.16
T. cornutus	4.5	0.19	0.12
C. luhuanus	2.1	0.23	0.22
P. arabica	2.5	0.80	0.09
R. captserpentis	0.81	0.53	0.04
C. sauliae	3.0	0.57	0.09
Cymatiidae sp.	2.1	0.28	0.15
M. asianus	1.7	0.87	0.20
P. bronni	1.9	0.18	0.10
P. trapezium	1.3	0.21	0.15
A. pectinata	2.7	0.17	0.10
M. edulis	1.9	0.47	0.21
T. phillippinarum	1.5	0.50	0.06

[3 tables, 21 references] FTP

4.14 COMPARISONS OF SPERM OIL-BASED E.P. [EXTREME PRESSURE] ADDITIVES WITH THEIR REPLACEMENT PRODUCTS

Thompson, P. F. (Keil Chem. Co., Inc., United States)
Chemical Abstracts 77, No. 24, 154244j (Dec. 11, 1972)

4.61 (6.54) ANTIOXIDANT EFFECT OF PROTEIN HYDROLYZATES IN A FREEZE-DRIED MODEL SYSTEM

Bishov, S. J., and A. S. Henick (Food Lab., Food Chemistry Div., U.S. Army Natick Lab., Natick, MA 01760)
Journal of Food Science 37, No. 6, 873-875 (Nov.-Dec. 1972)

Only a few antioxidants have been approved for food use; the primary ones are phenolic substances, synthetically produced. The use of synthetic antioxidants is being questioned by consumers, and nordihydroguariaretic acid (NDGA), for example, has been removed from the approved list. Interest in the search for natural antioxidants has increased, and certain workers have already demonstrated antioxidant activity in proteinaceous materials such as amino acids, linoleate salts of lysine and arginine, and hydrolyzed vegetable protein (HVP). The present study was carried out to determine the effectiveness of protein hydrolyzates, autolyzed yeast protein (AYP), and HVP as antioxidants and, if possible, to identify the active agents. AYP and HVP were selected for this initial study because of their ready availability.

The AYP and HVP were fractionated by a series of molecular sieves into three fractions of molecular weight: <700, between 700 and 1,500, and >1,500. A nucleotide-rich fraction was separated from AYP by an alcohol extraction, ion-exchange procedure. Antioxidant-free corn oil in a freeze-dried model system containing a carboxy-methyl-cellulose (CMC) matrix was used. The model system was prepared by adding in succession 50 ml. of water, the antioxidant test material in the required amounts, 1 g. of CMC, and 1 g. of corn oil. The mixture was blended, transferred to a 250-ml. round bottom flask, shell frozen, and then freeze

(over)

6.54 (0.6) FORTIFYING SOFT DRINKS WITH CHEESE WHEY PROTEIN

Holsinger, V. H., L. P. Posati, E. D. DeVilbiss, and M. J. Pallansch (Dairy Products Laboratory, Agricultural Research Service, U.S. Dept. of Agriculture, Washington, DC 20250)
Food Technology 27, No. 2, 59-60, 64-65 (Feb. 1973)

Carbonated beverages consist primarily of water, sugar, flavoring, and carbon dioxide. Better nutrition, particularly of children, could be achieved by fortification of soft drinks with valuable nutrients without detectable change in flavor or appearance. Proteins from cheese whey possess functional properties that may make them suitable for fortifying carbonated soft drinks. In this work, dried cottage cheese whey concentrate was added to carbonated beverages. The results of these solubility and stability studies indicated that carbonated soft drinks can be successfully fortified with cheese whey proteins. The success of such fortification of soft drinks, however, depends upon whether cheese whey proteins can be concentrated undenatured at a reasonable cost.
[6 figures, 4 tables, 14 references] FTP

6.137 FRACTIONAL VACUUM DISTILLATION OF HERRING OIL METHYL ESTERS

Ackman, R. G., P. J. Ke, and P. M. Jangaard (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of the American Oil Chemists' Society 50, No. 1, 1-8 (Jan. 1973)

The methyl esters of oil from the herring (Clupea harengus) were fractionally distilled under vacuum (batch basis and pilot plant scale) to find out if fractions of defined fatty acid compositions could be obtained that were of industrial use. Sixty-four methyl ester fractions were collected and analyzed by gas-liquid chromatography. Good yields were obtained of the short chain polyunsaturated fatty acids, but yields of 60% or less were obtained for long chain highly unsaturated acids due to their oxidation and thermal decomposition in the apparatus used. Recoveries of the major saturated and monounsaturated acids were excellent (about 100%). Assuming small amounts of unsaturated acids are acceptable, fractional distillation of low iodine value marine oils could inexpensively supply fractions with high levels of long chain methyl esters (C_{20} and C_{22}) monounsaturated and shorter chain (C_{14}) saturated, or (C_{16}) saturated-monounsaturated mixtures.
[3 figures, 3 tables, 27 references] FTP

7.42 A RAPID METHOD OF PREPARING FOOD FOR SODIUM AND POTASSIUM ANALYSES

Spitzer, Mary E., Charles Ritchey, James M. Glennon, Ysidro Villarreal, and Arthur D. Mason, Jr. (U.S. Army Institute of Surgical Research, Brooke Army Medical Center, Fort Sam Houston, Texas)
Journal of the American Dietetic Association 62, No. 1, 44-46 (Jan. 1973)

Food composition tables only provide estimates of the sodium and potassium content of foods. A dietitian involved in developing, preparing, and serving diets of precisely prescribed sodium and potassium levels should have the actual content defined by quantitative analysis. But, present methods of preparing foods for sodium and potassium analyses require considerable time. These methods involve digestion of the food with acid (wet ash) or burning the sample to an ash (dry ash). In this article, the authors present a method for preparing foods for analysis of sodium and potassium by flame photometry that can save up to 50% in time.

The method is as follows: Ten grams of the food sample and a quantity of deionized water are homogenized in a homogenizing flask. Liquid foods and butter are first dried at 110° C. to a constant weight. The food is homogenized at 45,000 r.p.m. for 20 min. while the homogenizing flask is held in ice. A portion of the homogenate is transferred quantitatively to a 250 ml. volumetric flask and made up to volume with deionized water. An aliquot is poured into a centrifuge tube and the tube and contents are centrifuged at 2,000 r.p.m. for 20 min. The

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6.35 CARRAGEENAN

Anonymous
Food Technology 27, No. 2, 79-80 (Feb. 1973)

Carrageenan is the natural product extracted from seaweed. It is extracted by cooking the seaweed in water. The water extract is then purified, decolorized, and dried to yield an active carrageenan in a ready-to-use, dry form. It is used as an emulsifier, stabilizer, and thickener in various foods such as ice cream and related dessert products, evaporated milk, puddings, low calorie foods, beverages, formulated baby foods, and others. Its level of use in food products ranges from 0.005% to 1.2%. The estimated daily ingestion per individual ranges from 0 to 1.5 g.--far below the acceptable level of 3.5 g. recommended by the FAO/WHO Expert Committee on Food Additives. Carrageenan was included on the first GRAS (Generally Recognized as Safe) list by the U.S. Food and Drug Administration on Nov. 20, 1959. The results of an independent private research laboratory, using the traditional 100-fold safety factor, indicated that no evidence of human hazard exists at the present levels of usage of carrageenan.

A chemically modified form of carrageenan (known as C-16) was developed in Europe and was used only in Europe in a pharmaceutical preparation for treatment of peptic ulcers. In a research study carried out by a medical college in New York, it was found that C-16 caused undesirable changes in the rectal areas of test rats. Thus use of C-16 in foods in the United States is banned. FTP

4.61 (6.54)

dried. The flask was stoppered and held at 65.5° C. The oxygen level in the headspace was determined at periodic intervals by gas chromatography; the end of the induction period was taken, arbitrarily, when 50% of the original oxygen in the headspace was consumed. AYP, HVP, and their hydrolysates were used alone and in combination with α-tocopherol and butylated hydroxyanisole (BHA).

Both AYP and HVP showed antioxidant activity. All fractions had antioxidant activity; those in the molecular weight range below 700 and those between 700 and 1,500 had greater activity than did those between 1,500 and 5,000. The maximum antioxidant effect of the hydrolysates was at about the 25% level (oil basis). The most active hydrolysate fraction increased the induction period by a factor of 10. A synergistic effect was noted in the combined effects of AYP with α-tocopherol or BHA.
[2 figures, 4 tables, 13 references] FTP

Doesburg, J. J., and J. Bon (IJmuiden, Netherlands)
Chemical Abstracts 77, No. 17, 112521s (Oct. 23, 1972)

6.54 CONCENTRATED FISH PROTEINS. TRENDS IN PAST AND FUTURE

7.42

supernatant solution is filtered, and the filtrate is then analyzed for sodium and potassium by flame photometry.

This new method of sample preparation requires much less time than the regular wet ash and dry ash procedures. Analytical results can be obtained in 4 hr. when the drying procedure is used and in 1 hr. when the drying procedure is not used. The dry ash method requires a minimum ashing time of 8 hr., while the wet ash method may require as much as 2 weeks to digest the foods.
[1 table, 9 references] FTP

Montoloy, F., M. Heurtebise, and J. Lubkowitz (Dep. Technol. Nucl., Inst. Venez. Invest. Client., Caracas, Venezuela)
Chemical Abstracts 77, No. 17, 112578r (Oct. 23, 1972)

7.42 SIMPLE METHOD FOR THE ACTIVATION ANALYSIS OF MERCURY IN FISH BY USING IODINATED RESINS

7.0 ADVANCED ANALYTICAL INSTRUMENTATION

Leslie, R. C. (Perkin-Elmer Ltd., Beaconsfield, Bucks., England)
Food Manufacture 47, No. 11, 41, 43, 46 (Nov. 1972)

The author describes some of the more advanced analytical instruments which combine a high degree of automation with great precision and discusses the principles on which they are based. The analytical instruments were classified into two categories; (1) those which separate mixtures and (2) those which identify single components or measure a physical property that can be related to chemical or physical structure of the component. The instrumentation used in the first category includes gas-liquid and liquid-solid chromatography. The second category involves radiation techniques of molecular absorption, atomic absorption, infrared absorption, and resonance and fluorescence radiation. Other techniques discussed are thermal and elemental analyses.
[2 illustrations] FTP

Misra, K. C., and K. K. Saroj (Reg. Res. Lab., Bhubaneswar, India)
Chemical Abstracts 77, No. 3, 18133v (July 17, 1972)

7.51 COLORIMETRIC METHOD FOR THE ESTIMATION OF PROTEIN NITROGEN IN FISH FLOUR AND FISH MEAL (6.54)

7.42 "COLD VAPOR" METHOD FOR DETERMINING MERCURY

Kopp, John F., Mary C. Longbottom, and Harry B. Lobring (Analytical Quality Control Laboratory, Environmental Protection Agency, Cincinnati, Ohio)
Journal of the American Water Works Association 64, No. 1, 20-25 (Jan. 1973)

In this method for determining mercury, the mercury in the sample is reduced in aqueous solution with stannous sulfate. A stream of air is bubbled through the solution; the airstream carries the mercury vapor into a flow-through absorption cell positioned between a source of 253.7-nm. wavelength light and a detector. The amount of absorption of light is proportional to the concentration of mercury. The method can be used on potable water, surface water, and various industrial (including sewage-treatment plant) effluents. Prior to mercury determinations fish tissues are processed according to the method of J. F. Uthe, F. A. J. Armstrong, and M. P. Stainton [Journal of the Fisheries Research Board of Canada 27, 805 (1970)].
[1 figure, 5 tables, 18 references] FTP

8.51 PRESENCE OF TAURINE IN THE EXTRACT OF HARD CLAM

Watanabe, Katsuko, and Shoji Konosu (Laboratory of Marine Biochemistry, Faculty of Agriculture, University of Tokyo, Bunkyo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1311 (Nov. 1972)

In 1970, other workers reported that the hard clam Meretrix lusoria was lacking in taurine, but other mollusks contained it. In the present study, the authors isolated and confirmed the presence of taurine in the hard clam.
[1 figure, 6 references] FTP

7.62 GAS CHROMATOGRAPHIC ESTIMATION OF THIAMINE

Dwivedi, Basant K., and Roy G. Arnold (Dept. of Food Science and Technology, University of Nebraska-Lincoln, Lincoln, NE 68503)
Journal of Food Science 37, No. 6, 889-891 (Nov.-Dec. 1972)

The present chemical, biological, and microbial methods for vitamin analysis are too complex and time consuming for routine quality control applications. This paper describes a simple gas-liquid chromatographic method for estimating the amount of thiamine in food products and pharmaceutical preparations. The thiamine is extracted by refluxing the sample in 0.1 N HCl, followed by enzymatic hydrolysis with Takadiastase or Mylase-P. The thiamine solution is incubated in the presence of bisulfite at pH 6.0; thus the extracted thiamine is quantitatively cleaved into 4-methyl-5-(ß-hydroxyethyl) thiazole and a pyrimidine moiety. The 4-methyl-5-(ß-hydroxyethyl) thiazole is extracted with chloroform/methanol solvent, and is converted into its trimethylsilyl (TMS) derivative by adding BSA (N,O-Bis [trimethylsilyl acetamide]). The TMS derivative is analyzed by gas-liquid chromatography using a flame ionization detector.
[3 figures, 6 references] FTP

8.59 PIGMENTED CALCAREOUS SKELETONS OF SOME CORALS

Fox, Denis L. (Scripps Institution of Oceanography, University of California, La Jolla, CA 92037)
Comparative Biochemistry and Physiology 43, No. 4B, 919-927 (Dec. 15, 1972)

The chemical characteristics of colored molecules in the tissues of many animals, and their wide occurrence are well known. There is less information available on several of these molecules (or pigments) which have been deposited in the skeletons of the sessile, colonial animals such as coelenterates (corals) and bryozoans [small, tufted organisms connected to each other in a colony covered with secreted gelatinous chitinoid or calcareous film].

Tests on the following coral skeletons were performed to identify their color chemically.

Order		
Stolonifera:	Tubipora musica	(the red organ-pipe coral)
Gorgonacea:	Adelogorgia phyllosclera	(pink-purple)
	Muricea californica	(orange to brick-red)
	Lophogorgia chilensis	(slender salmon-pink branches)
	Corallium rubrum	(deep orange-red precious coral)
Hydrocorallina:	Stylaster roseus	(purple)
	Stylaster elegans	(pink and orange)
	Stylaster sanguineus	(pale pink)
	Distichopora coccinea	(vermilion)

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7.51 QUANTITATIVE ASSAY FOR SUBMICROGRAM AMOUNTS OF PROTEIN

Goldberg, Melvin L. (Dept. of Pathology, University of California, San Francisco, Calif.)
Analytical Biochemistry 51, No. 1, 240-246 (Jan. 1973)

A colorimetric method for the determination of protein is described that is 500 times more sensitive than the common method reported by O. H. Lowry, N. J. Rosebrough, A. L. Farr, and R. J. Randall [J. Biol. Chem. 193, 265 (1951)]. The results are linear between 0.01 and 0.2 µg. protein.

In this assay copper is complexed to protein. The copper reagent consists of a mixture of sodium hydroxide (2.2 N), cupric sulfate (0.022 M), and sodium potassium tartrate (0.044 M). Concentrated NaOH is added to the protein (1% bovine serum albumin solution) to make the equivalent of a 0.1 N NaOH solution. The copper reagent is added to the protein solution and incubated for 15 min. at room temperature. Excess copper is removed by passing the reaction mixture through a very small, fast-flowing Sephadex column. The fluid collected from the column contains the copper protein complex. The protein in the complex is digested with the addition of hydroperoxide and incubation for 90 min. at 25° C. The mixture is then boiled for 1 hr. A reagent consisting of phenol prepared with NaOH and a 10% chloramine-T solution in KOH is added to the digested protein copper complex. The color reaction between the two reagents, catalyzed by copper, occurs at pH 11.4 to 11.8. Absorption in a photospectrometer is read at 410 nm. against water; the water reading is subtracted from the copper catalyzed color reading. Protein inhibits the color producing copper catalyzed reaction between phenol and chloramine-T; thus, the concentration of color is proportional to the protein-copper which passed through the Sephadex column.
[1 figure, 1 table, 7 references] SW

8.59

Examined under near ultraviolet light, none of these skeletons exhibited fluorescence except S. elegans, whose pink parts showed orange fluorescence. Bits of the skeletons of the gorgonia were treated with dilute acetic acid to dissolve the material with evolution of CO_2. The resulting solution was colored but no pigment was extractable with hexane or chloroform, indicating that carotenoids and porphyrins were not present.

The only stolonifera tested was digested with Na_2EDTA (no other identification). The resulting suspension showed no spectroscopic absorption bands, no color change in acid or alkaline conditions, and under near ultraviolet illumination, gave a dark green fluorescence. There was no recoverable color in hexane extractions of the digest. Treatment of the skeleton with either dilute acetic acid followed by hexane extraction, or hot KOH yielded no pigment.

Skeletons of the hydrocorallina ground and treated with Na_2EDTA gave a colloidal solution that was extracted with hexane and then ethanol. Pigment that migrated to the hexane layer exhibited an absorption maximum typical of astaxanthin. Further treatment with NaOH converted the astaxanthin to the red disodium soap astacene. All four species yielded the carotenoid astaxanthin. In addition, S. elegans contained xanthophyll.

Based on his earlier work the author speculated that coral skeletons contain, in addition to pigments, other organic compounds such as palmitic, stearic, and fluorescent chromolipid acids.
[14 references] SW

7.42 (6.133) THE ANALYSIS OF ORGANICALLY BOUND ELEMENTS (As, Se, Br) AND PHOSPHORUS IN RAW, REFINED, BLEACHED AND HYDROGENATED MARINE OILS PRODUCED FROM FISH OF DIFFERENT QUALITY

Lunde, Gulbrand (Central Institute for Industrial Research, Forskningsvn. 1 Blindern, Oslo 3, Norway)
Journal of the American Oil Chemists' Society 50, No. 1, 26-28 (Jan. 1973)

The purpose of this work was (1) to determine how the selenium, arsenic, phosphorus (that is, phospholipid), and bromine contents of fish oils varied when produced from fish in different stages of quality (from fresh to spoiled) and (2) to examine how the levels of these elements may vary in these oils during their alkali-refining, bleaching, and hydrogenation processes. Herring and mackerel were used. The fish were stored until they became quite spoiled. Oil was extracted from samples of the fish at periodic intervals of storage. The quality condition of the fish was characterized by tests for total volatile nitrogen in the raw tissue and the free fatty acid content of the extracted oil. The oils were then refined under laboratory conditions using a nickel catalyst. The various oils at various stages of treatment were analyzed for As, Se, Br, and P.

When the raw fish deteriorates during storage, there is an increase in the Se and P contents of the oils prepared from these fish, but the As and Br content of the oils remains nearly the same. When the oils are refined, their As and P content almost completely disappears, but the Se content is reduced to about two-thirds the original level and the Br content remains unaffected. The Se disappears relatively fast and the Br relatively slowly during the hydrogenation process of the oils. Both the selenium and the bromine organic compounds in marine oils seem to inactivate the catalyst during the hydrogenation of fish oils.
[2 figures, 2 tables, 5 references] FTP

8.59 (8.46) THE PRESENCE OF VOLATILE, NONPOLAR BROMO ORGANIC COMPOUNDS SYNTHESIZED BY MARINE ORGANISMS

Lunde, Gulbrand (Central Institute of Industrial Research, Forskningsv. 1, Blindern, Oslo 3, Norway)
Journal of the American Oil Chemists' Society 50, No. 1, 24-25 (Jan. 1973)

In earlier work, the author demonstrated the presence of lipid soluble bromo organic compounds in marine oils. In the present study, he demonstrated the presence of volatile, nonpolar bromine-containing compounds in marine organisms. The materials examined were cod liver oil; cod fillet; cod liver; mackerel fillet; halibut fillet; capelin, whole fish; herring, whole fish; mussel, whole animal; and seaweed, whole plant. In tissues containing high fat content, the volatile, nonpolar bromine containing compounds represented about 0.1 to 1.0% of the total amount of bromo organic compounds present in the marine oils. In the tissues of low fat content, a higher level of bromo organic compounds was found. These bromo organic compounds are probably synthesized in one or more stages in the food chain. The author believes that most of the bromine-containing compounds will probably pass the usual methods of sample clean-up employed in analysis for chlorinated hydrocarbons in the environment, and they will be detected by electron capture gas chromatography. There is the possibility, therefore, of their being mistakenly identified as pollutants with long biological half lives. Also, because of the ubiquitous occurrence of these brominated hydrocarbons among all classes of organic compounds, it appears that their mechanism(s) of formation is not very specific and that chlorine may be incorporated as well.
[1 table, 3 references] FTP

9.10 (2.146) AN ACOUSTIC DATA ACQUISITION SYSTEM FOR RESEARCH ON PELAGIC FISH SCHOOLS

Holliday, D. V. (University of California, San Diego Marine Physical Laboratory, Scripps Institution of Oceanography, San Diego, CA 92152)
MPL Technical Memorandum 237, University of California, San Diego, Marine Physical Laboratory of the Scripps Institution of Oceanography, San Diego, CA 92152 (Oct. 31, 1972), 110 pp.

In an earlier report the author dealt with the use of acoustics as a tool to assist in the remote identification of schools of commercially important marine fish. The results of direct biological sampling were combined with theoretical predictions for acoustic resonant swimbladder response and compared with experimentally observed resonances. The motions observed were divided into two groups: the track and swimming speed of the school was interpreted in terms of cruising speed; and the magnitude and duration of high-speed swimming bursts was interpreted to give estimates of the average fish length in the school. Internal school dynamics were investigated acoustically to observe echo frequency distribution. Frequency distribution was interpreted as resulting from doppler shifts due to motion in the school. The doppler shifts were divided into those caused by body- and tail-related swimming motions, near side aspects, and those related to behavioral swimming characteristics, near tail or head aspect. Side aspect data were used to estimate fish length. Tail and head aspect data were correlated with echo level, school dimensions, and school swimming speed to demonstrate that the

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9.11 DEEP-SEA BENTHIC COMMUNITY RESPIRATION: AN IN SITU STUDY AT 1850 METERS

Smith, K. L., Jr., and J. M. Teal (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Science 19, No. 4070, 282-283 (Jan. 19, 1973)

Organisms inhabiting the deep sea live in an environment of low food supply and high pressure. Reports from other work lead to the conclusion that deep-sea organisms will show decreasing oxygen uptake as depth increases with concomitant pressure rise. To study oxygen uptake as a measure of metabolism in this environment, tests were performed in situ on undisturbed benthic communities. Bell jars, which were equipped to measure oxygen consumption, were placed on the sediment, enclosing an area of 48 $cm.^2$. The jars were placed from the deep-sea research submersible Alvin at a depth of 1,850 m. Measurements of oxygen uptake were made over a period of 48 to 72 hr.; in this time the oxygen concentration was reduced 12 to 18%. Formaldehyde was injected into the jars to poison the biological oxygen demand. After the addition of formaldehyde, no residual oxygen uptake was detected. Under these conditions, the lack of residual oxygen uptake indicates that the measured uptake was due to biological activity, and it suggests that the accumulation of biologically oxidizable matter is negligible.

The oxygen concentration of the bottom water was 7.15 ml. per liter at 4.5° C. The mean value of 10 measurements of total oxygen uptake was 0.50 (±0.03) ml. per square meter (of sediment area) per hour. This uptake is two orders of magnitude lower than values calculated from data of shallow depths. The authors conclude that metabolic activity of deep-sea communities is low.

[1 table, 13 references]

SW

9.12 (1.23) POPULATION STRUCTURE AND MOVEMENTS OF ATLANTIC MENHADEN (BREVOORTIA TYRANNUS), AS INFERRED FROM BACK-CALCULATED LENGTH FREQUENCIES

Nicholson, William R. (National Marine Fisheries Service, NOAA, Atlantic Estuarine Fisheries Center, Beaufort, NC 28516)
Chesapeake Science 13, No. 3, 161-174 (Sept. 1972)

The Atlantic menhaden is an important link in the food chain that supports predatory food fishes. Ranging from off central Florida to the Gulf of Maine, it also supported a large fishmeal and oil industry until the menhaden population declined drastically in the 1960's.

As part of a continuing program, catches of Atlantic menhaden were sampled for age and length at reduction plants from Florida to Massachusetts. For the years 1955 to 1964, lengths at the time of the first annulus formation were back-calculated from age-1, -2, and -3. Length frequency distributions, derived from monthly and seasonal totals, were plotted for the year classes. Meristic data on population structure were reviewed. General conclusions drawn from supporting data were (1) mixing of menhaden of all ages from all areas occurs south of Cape Hatteras, N.C., during the winter, (2) at the time of first annulus formation in early spring, age-1 menhaden segregate by size along the coast (the size of fish increases along the coast from south to north), (3) all menhaden do not return to the same area they occupied the previous year, (4) for normal year class, recruitment into the fishable population may not be complete until late in the second summer of life (age-1); for exceptionally large year classes recruitment may not

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9.13 (0.35) STUDIES ON METABOLISM OF FATTY ACID IN FISH--II. COFACTORS EFFECTING ß-OXIDATION SYSTEM OF FATTY ACID IN CARP HEPATOPANCREAS MITOCHONDRIA

Murata, Hisashi, and Masamichi Toyomizu (Lab. Fish. Tech., Fac. Agr., Kyushu Univ. Fukuoka, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1293-1298 (Nov. 1972) (In Japanese; figures, tables, and abstract in English)

This paper reports on the cofactors that may affect the activity of the ß-oxidation in carp (Cyprinus carpio) hepatopancreas mitochondria. Having found that carnithine, CoA, ATP, and Mg^{++} accelerated the O_2 uptake, the authors devised an improved medium to further study the ß-oxidation system.

In the improved medium, the O_2 uptake in the carp hepatopancreas mitochondria was 4.7 times that found when using the original medium; however, the endogenous respiration remained unchanged. When CoA and carnitine was eliminated from the improved medium, there was a considerable decrease in the O_2 uptake. This suggested that the activation of fatty acids and the permeation of the activated acids through the membrane are probably the initial stages of the ß-oxidation phenomenon. The O_2 uptake in the improved medium was not affected until the sample of mitochondria was left at 0° C. for 12 hr.

[2 figures, 2 tables, 13 references]

FTP

9.10 UNISEXUAL FISH: LABORATORY SYNTHESIS OF A "SPECIES"

Schultz, R. Jack (Ecology Section, Biological Sciences Group, University of Connecticut, Storrs, CT 06268)
Science 179, No. 4069, 180-181 (Jan. 12, 1973)

All female clones that were comparable to those of a wild unisexual "species" Poeciliopsis monacha-lucida (living in northwestern Mexico) were produced by hybridizing bisexual (gonochoristic) fishes. The unisexuals produced in the laboratory consistently gave birth only to female progeny for six generations.
[1 figure, 1 table, 11 references] FTP

9.10 (2.146)

observed doppler effects could have resulted from unique swimming behavior and thus related to fish identity or signature.

To control the complexity of the data acquired, a data acquisition system was necessary. The author put together a system consisting of a computer, spectrum analyzer, spectrum averager, teletype with low-speed tape reader and punch, a high-speed tape reader and punch, four, single track digital cassette tape recorders, a plotter, and an eight channel analog multiplexer. This equipment was found useful in the study of the acoustic signatures of pelagic fish schools. The report lists the machines used and the routines for operation of each.
[4 figures, 14 references] SW

9.11 CONCENTRATION OF SUSPENDED PARTICULATE MATTER IN SURFACE SEA WATER

Chester, R., and J. Stoner (Dept. of Oceanography, The University, Liverpool, L69 3BX, England)
Nature 240, No. 5383, 552, 553 (Dec. 29, 1972)

The kind and amount of suspended particles in the World Ocean is related to geological, geochemical, and environmental problems. Reports from other workers on particulate matter in sea-water report concentrations that are at variance from each other in the order of one or two magnitudes.

A study was conducted to determine the particulate matter encountered by a merchant ship enroute to Japan from Britain and return. Collections were made by pumping surface sea water from a position at the ship's bows through a 0.45-μm. membrane filter of known weight. The filter was washed with distilled water until salt free, dried at 60° C. to constant weight, and the weight of particulate matter determined.

The average amount of suspended matter along the margins of the eastern North Atlantic Ocean during April and July was 467 μg. per liter. In the open ocean of the South Atlantic during April and July, the average was 150 μg. per liter. The content of suspended material in waters from near-shore localities ranged between 84 and 2,609 μg. per liter. In marginal seas such as the Japan Inland Sea, the average concentration was 1,500 μg. per liter.

Various factors alter the concentration of suspended matter in sea water. Particles from organisms fluctuate seasonally and are concentrated in areas where upwelling occurs; river runoff affects the amount of inorganic suspended matter in near-shore areas.
[1 figure, 1 table, 7 references] SW

9.12 A LIST OF THE FRESH AND SEA WATER FISHES OF GREECE

Ondrias, John C. (Zoological Laboratory, University of Patras, Greece)
Hellenic Oceanology and Limnology (Period C) 10, 23-96 (1971) (Institute of Oceanographic and Fishing Research, Ministry of Culture and Sciences, Athens, Greece)

This work is a general survey of the fresh- and sea-water fishes of Greece. The scientific name for each species is given and the common name for most species is given in Greek.
[202 references] FTP

9.12 (1.23)

be complete until the beginning of the third summer (age-2), and (5) Atlantic menhaden constitute a single homogeneous population, rather than two or more subpopulations as previously hypothesized.
[7 figures, 4 tables, 13 references] SW

9.1 BIOLOGICAL STUDY ON OVULATION IN VITRO OF FISH.
III. INDUCTION OF IN VITRO OVULATION OF ORYZIAS LATIPES OOCYTES USING SALMON PITUITARY GONADOTROPIN

Hirose, Keiji, and Edward M. Donaldson (Ocean Res. Inst., Univ. Tokyo, Tokyo, Japan)
Chemical Abstracts 77, No. 17, 109650c (Oct. 23, 1972)

9.13 [PARASITIC COPEPODS FROM THE FISHES OF TUNISIA]
COPEPODES PARASITES DES POISSONS DE TUNISIE

Raibut, André, Oum Kalthoum Ben Hassine, and Kalthoum Maamouri (Laboratoire de Biologie Marine, Faculté des Sciences, Tunis)
Bulletin de l'Institut National Scientifique et Technique D'Océanographie et de Pêche 2, No. 2, 169-197 (1971) (Republic of Tunisia)

This article lists the parasitic copepods from the fishes of Tunisia. The list comprises 15 species belonging to 8 families and 11 genera.
[62 figures, 64 references] FTP

9.14 STUDIES ON THE UTILIZATION OF PETRO-YEAST AS DIET OF FRESHWATER FISH--I. THE DISTRIBUTION OF CHITIN DECOMPOSING BACTERIA IN DIGESTIVE TRACTS

Zenro, Minami, Masanao Kajita (Nagase and Co., Ltd., Amagasaki, Japan), and Susumu Hibino (Feed Dept., Zenkoren, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 9, 1013-1019 (Sept. 1972)

Yeast derived from metabolizing petroleum (petro-yeast) are characteristically high in chitin content. The ayu (Plecoglossus altivelis), carp (Cyprinus carpio), and rainbow trout (Salmo gairdneri) use petro-yeast in their feed with high efficiency. To elucidate such efficient utilization of petro-yeast by these fish, the distribution of chitin decomposing bacteria in their digestive tracts was examined.

Chitin decomposing bacteria were isolated in relatively high frequency. The proportion of chitin decomposing bacteria to total bacteria in the digestive tract was high in each species of fish. According to biochemical characteristics, most of the chitin decomposing bacteria were considered to belong to the genus Aeromonas. In contrast, chitin decomposing bacteria in the digestive tracts of marine fish were mainly under the genus Vibrio.

In further studies of utilization of feed, carp was determined to use petro-yeast most efficiently. The authors attribute the utilization efficiency to a high incidence of chitin decomposing bacteria in the digestive tract of the carp. [5 tables, 26 references] SW

9.16 (1.89) CRAYFISH FARMING IN THE UNITED STATES

Avault, James W., Jr. (Fisheries Division, School of Forestry and Wildlife Management, Louisiana State University, Baton Rouge, LA 70803)
Sea Grant Preprint, Center for Wetland Resources, Louisiana State University, Baton Rouge, LA 70803 (1972), 23 pp. Price not given.

This article is a reprint of a report presented at the First International Symposium on Freshwater Crayfish, Sept. 12-15, 1972, at Hinterthal, Salzburger Land, Austria.

This article is a brief summary of crayfish farming in the United States and covers the classification of the species, the biology of crayfish, parasites and diseases of crayfish, crayfishing areas, crayfish farming, and processing and marketing. It includes a partial list (58 names) of investigators involved in the study of crayfish resources in the fields of cultivation, commercial utilization, diseases and parasites, pesticides, ecology, food science, and physiology. In addition, there is a list of 34 registered Louisiana crayfish processing plants. [11 references] FTP

9.19 EFFECTS OF POLYCHLORINATED BIPHENYL ON MARINE PHYTOPLANKTON COMMUNITIES

Moore, Stanley A., Jr., and Robert C. Harriss (Dept. of Oceanography, Marine Laboratory, Florida State University, Tallahassee, FL 32306)
Nature 240, No. 5380, 356-358 (Dec. 8, 1972)

This article reports the first in situ bioassay of short term effects of polychlorinated biphenyl compounds (PCBs) on natural marine phytoplankton communities. The effect in situ of a range in PCB concentrations to photosynthetic radiocarbon uptake in the natural communities of phytoplankton were determined in experiments conducted in St. George Sound in the northeastern Gulf of Mexico near Franklin County, Fla., during August-November 1970 and February-April 1971. The most predominant group among the phytoplankton were the diatoms represented by the following genera: Cerataulina, Chaetoceros, Biddulphia, Eupodiscus, Leptocylindrica, Melosira, Nitzschia, Rhizosolenia, and Thallasionema. Dinoflagellates (Peridinium and Ceratium) were generally present. Data were obtained on the amount of uptake of radiocarbon by phytoplankton exposed to various concentrations of PCB relative to control populations. The PCB compounds tested were 2,4'-dichlorobiphenyl, Aroclor 1242, and Aroclor 1254. The two Aroclors are isomeric mixtures of pure chlorinated biphenyl and differ in their degree of chlorination. The effects of the PCBs were compared with that of p,p'-DDT.

DDT at 5 p.p.b. and 2,4'-dichlorobiphenyl at 7 p.p.b. inhibited phytoplankton radiocarbon uptake. The LC_{50} value for p,p'-DDT was 35 p.p.b.; that for 2,4'-dichlorobiphenyl was 30 p.p.b. Aroclor 1242 was toxic to phytoplankton at levels

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9.19 PCB CONTAMINATION FROM BOAT BOTTOM PAINT AND LEVELS OF PCB IN PLANKTON OUTSIDE A POLLUTED AREA

Jensen, S., and L. Renberg (Swedish Environmental Protection Board, Special Analytical Laboratory, Wallenberglaboratoriet, Lilla Frescati, 104 05 Stockholm 50, Sweden), and M. Olsson (Swedish Museum of Natural History, 104 05 Stockholm 50, Sweden)
Nature 240, No. 5380, 358-360 (Dec. 8, 1972)

Samples of zoo- and phytoplankton were collected in Stockholm Harbor in Sept.-Oct. 1971 and in June 1972 to determine if contamination of plankton might occur from the antifouling paint, containing PCB, used on the boat. The plankton samples were taken at various locations around the boat in a 0.1-mm. mesh net while the boat was moving at a speed of about 1 knot. The PCB level was determined in terms of the extractable fat because it was difficult to determine the true sample weight. Samples were also taken of stirred boat paint. The following table shows the PCBs in plankton taken at different points in relation to the boat.

Date of sample	PCB in plankton sample (p.p.m. on fat weight basis)		
	Astern	7 foot amidships	From the bowsprit
Oct. 1971	80	18	-- [1]
June 1972	170	12	7.6

[1] No collection.

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9.17 BIOTA OF CHESAPEAKE BAY

McErlean, Andrew J., Catherine Kerby, and Marvin L. Wass (editors)
Chesapeake Science 13, Supplement, 197 pp. (Dec. 1972)

The biota of Chesapeake Bay is being subjected to environmental stresses which eventually may cause major alterations of resident ecosystems. In order to prevent or control these modifications, changes in the biota must be detected before they reach an irreversible state.

The Congress of the United States directed the U.S. Army Corps of Engineers to make a complete investigation of water utilization and control of the Chesapeake Bay Basin. The staff of the Corps arranged for a study of the biota of the bay to be conducted by the personnel of a consortium of the following institutions: The Johns Hopkins University, University of Maryland, Virginia Institute of Marine Science, and Smithsonian Institution.

The results of the study were published in this special issue of Chesapeake Science and include the following major topics: (1) a summary of the current state of knowledge of many groups of organisms living in the bay; (2) current status of research and knowledge on four topics of concern--sediments, eutrophication, heavy metals, and pesticides; (3) a review and report on the value of various criteria for measuring biological effects of environmental changes in the bay; and (4) systems for handling the massive data which must be used in managing a complex ecosystem.

These reports provided the first comprehensive summary of biota of Chespeake Bay, the largest and most valuable estuarine system in the United States. SW

9.14 (1.69) STUDIES ON THE NUTRITION OF MARINE FLATFISH. THE PROTEIN REQUIREMENT OF PLAICE (PLEURONECTES PLATESSA)

Cowey, C. B. (Institute of Marine Biochemistry, St. Fittick's Road, Aberdeen, AB1 3RA, Scotland), J. A. Pope, J. W. Adron, and A. Blair
British Journal of Nutrition 28, 447-456 (1972)

A high dietary protein requirement by several species of fish has been reported elsewhere. Dose-response is the criterion. For example, the chinook salmon dose-response curve for dietary protein levels off at a protein concentration between 40 and 55%, depending on temperature, and at 40% for channel catfish.

The dietary protein requirement of young plaice in water at 15° C. was examined by feeding six rations containing protein at equally spaced concentrations between 20 and 70% of the dry diet. The protein source was freeze dried cod muscle.

The results indicate that weight gain increased steadily up to a level of about 50% protein in the diet and subsequently fell. The authors suggest the possibility that very high dietary protein levels may depress growth rate. The estimated dietary protein requirement of plaice for optimum growth was found to be 52%, the same order as that reported for other carnivorous fish.

Net protein utilization and protein efficiency ratio were measured at each dietary protein level. The results indicated less efficient utilization of dietary protein by plaice than by rats.

The gross composition of the plaice in the experiment also varied with protein dietary level; the carcass protein content increased with dietary protein level. The plaice carcass in the experiment had greater lipid content than that of wild plaice, and the larger amounts probably reflected the levels of lipid in the diets.
[2 figures, 7 tables, 15 references] SW

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The total amount of PCB compounds in plankton samples from different localities in Stockholm Harbor ranged from 3.1 to 35 p.p.m. (on fat weight basis). There was a decrease in the levels of PCB in plankton in the peripheral parts of the archipelago.

The study demonstrated that samples of plankton collected in the wake of the boat are strongly contaminated with PCB from the bottom paint. It is possible, therefore, that the archipelago of Stockholm is polluted not only from sources on the shore, but also from boats. Furthermore, the PCB pollution of the Baltic may, to some extent, depend upon the traffic of boats.
[2 figures, 3 tables, 8 references] FTP

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as low as 1 to 2 p.p.b. (with LC_{50} value of 6.5 p.p.b.) and Aroclor 1254 was also toxic at 1 to 2 p.p.b. (with LC_{50} value of 15 p.p.b.). These levels are considerably below the published values of 0.3 to 1.5 p.p.b. sea water solubility of Aroclor 1254.

The results suggest that the toxic effects of organochlorine are more acute in situ at a community level than for single species laboratory cultures.
[1 figure, 18 references] FTP

9.19 PHOTOMETRIC METHODS FOR DETERMINING TOXICITY (BASED ON THE HEMOGLOBIN LEVEL AND THE OSMOTIC RESISTANCE OF ERYTHROCYTES IN FISH)

Luk'yanenko, V. I. (Tsentr. Nauchno-Inst. Osetrovogo Rybn. Khoz., Astrakhan, U.S.S.R.)
Chemical Abstracts 77, No. 11, 70961c (Sept. 11, 1972)

9.19 ZINC-65 UPTAKE BY A BACTERIUM ISOLATED FROM ALDER SLOUGH, COLUMBIA RIVER ESTUARY (0.5)

Tonjes, Stephen Dodd (Oregon State Univ., Corvallis, Oreg.)
Chemical Abstracts 77, No. 15, 98357j (Oct. 9, 1972)

9.19 REMOVAL OF HEAVY METALS FROM WATER AND BRINE USING SILICON ALLOYS

McKaveney, James P., William P. Fassinger, and David A. Stivers (Garrett Research and Development Co., Inc., La Verne, CA 91750)
Environmental Science & Technology 6, No. 13, 1109-1113 (Dec. 1972)

Methods for removal of heavy metals from waste waters and brine were examined. The heavy metals group consists principally of arsenic, cadmium, copper, lead, and zinc. Because of economics or other considerations ion exchange with resins, activated carbon, and solvent extraction were not considered. Metallic exchangers, however, were selected for study because of their broad activity, economy, and simplicity in removal of metallic impurities from water. The exchange is limited to the removal of metals below the exchanger metal in the electromotive series. These reactions require an additional treatment with alkali to separate the unwanted metal ions from solution as insoluble metal hydroxides. Elimination of this step would permit use of more active exchange metals such as calcium or magnesium; however, calcium is extremely reactive with water and magnesium corrodes over an extended period. To make these exchanger metals more resistant to aqueous attack, the use of alloys of these metals was considered.

Initial studies were performed to find alloy types and to determine their ability to remove the more common heavy metals. Silicon alloys of calcium and magnesium produced the best results with regard to broad coverage and replacement of heavy metals with elements common in natural waters (calcium and magnesium). Ferrosilicon was fairly selective in removing mercury without iron contamination.

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9.19 PERSISTENT PESTICIDES AND PCBs IN THE ENVIRONMENT

Anonymous
Nature 240, No. 5380, 319-320 (Dec. 8, 1972)

Organochlorine insecticides (for example, DDT and dieldrin) have been used in agriculture and in the control of disease vectors for more than 20 years. The polychlorinated biphenyls (PCBs) have been used in plastics, paints, and other industrial products for about the same length of time. These substances persist in the environment for a long period; furthermore, they are fat soluble which causes them to be stored in lipids and thus to be transferred from one organism to another. Three questions have arisen concerning the significance of the pesticides and PCBs in the environment.

The first question relates to their identification in the environment. Errors in identifying organochlorine insecticides were possible earlier; however, both the pesticides and PCBs can now be correctly identified, although there are still considerable difficulties in quantifying small amounts of PCBs in the field. The PCBs and organochlorine insecticides are unquestionably widely distributed in water, soils, and organisms throughout the world.

The second question is whether both types of substances are biologically active at the low levels that they are found in the field. Laboratory studies have shown that the substances can have measurable effects at dose rates considerably below those which are lethal, but whether these effects occur in the field and are important are not known.

The third question is: Do persistent organochlorine insecticides and PCBs significantly affect populations of organisms other than those in target areas or

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9.19 LIMITING FACTORS IN PHYTOPLANKTON ALGAE: THEIR MEANING AND MEASUREMENT

O'Brien, W. John (Dept. of Systematics and Ecology, University of Kansas, Lawrence, KS 66044)
Science 178, No. 4061, 616-617 (Nov. 10, 1972)

Understanding and controlling eutrophication requires knowledge of the factors limiting the growth of phytoplankton algae. There are two common responses of plants to changes in concentration of limiting factors: change in the final yield (type I response) or change in the growth rate (type II response). Type II response is typical of phytoplankton algae in nature, but in some laboratories experiments have failed to show growth rate changes. The author believes that one rate limiting factor, in these experiments, was in such low concentration that it obscured the effect which a change in concentration or intensity of other limiting factors could have had on growth rate. The intensity of light could have such an effect. At low intensities a change in concentration of nitrogen and phosphorus had no effect on the rate of growth; at medium light intensities the rate of growth was higher with increased concentration of nitrogen and phosphorus. Such a situation may be common in laboratory studies where it is difficult to supply natural light intensities, and it may account for much data that fit growth response patterns of type I rather than of type II.

Another source of difficulty in observing change in growth rate involves use of a batch culture technique. A large amount of water to be tested and incubated with a relatively small inoculum of a test organism rarely shows a type II growth

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9.19 CLINICAL SYMPTOMS OF MERCURY POISONING IN MAN

Bidstrup, P. Lesley (11 Sloane Terrace Mansions, Sloane Terrace, London SW1X 9DG, England)
Biochemical Journal 130, No. 2, 59P-61P (Nov. 1972)

Mercury vapor, inorganic compounds of mercury, and aryl series organic compounds of mercury such as phenylmercuric acetate produce symptoms that are different from those caused by short-chain alkylmercury compounds such as ethyl and methylmercury.

Mercuric chloride ($HgCl_2$), otherwise known as corrosive sublimate, is seldom found as a cause of acute, systemic poisoning in modern times. Exposure to high concentrations of mercury vapor causes lung irritation. Constant exposure to metallic mercury with absorption from inhalation of vapor and droplets, or through the skin results in nervousness, irritability, blushing, change of temperament, and tremor. These symptoms subside upon removal from exposure. Proteinuria is a rare nephrotic symptom. Normal mercury output in urine is less than 25 µg. per liter; it fluctuates from those exposed to mercury. Compounds such as phenylmercuric acetate have been used as fungicides and germicides in therapy and as fungicides in industry. Inorganic and phenylmercury compounds can be found in the following tissues of subjects after exposure: kidney, liver, spleen, muscle, and blood. They disappear quickly from all tissues except the kidney.

Ethyl and methyl derivatives of mercury are highly toxic, acting on the central nervous system and sensory peripheral nerves. In mild cases symptoms may be

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pattern. In this kind of experiment a diminished growth rate (caused by a low concentration of a limiting factor) appears only as the phytoplankton population approaches maximum yield. However, the change in growth rate is almost impossible to observe, because while the population is growing exponentially the nutrient concentration is decreasing exponentially. Only during the last days of the experiment does the population encounter a rapidly decreasing nutrient concentration; the rate of growth change is abrupt and difficult to detect.

Workers in the eutrophication field ought to recognize the basic differences in the two growth patterns and design experiments that will test for changes in growth rate (type II) rather than type I.

[2 figures, 20 references] SW

Pearcy, William G., and Robert R. Claeys (Oregon State Univ., Corvallis, Oreg.)
Chemical Abstracts 77, No. 15, 98391r (Oct. 9, 1972)

9.19 ZINC-65 AND DDT RESIDUES IN ALBACORE TUNA OFF OREGON IN 1969 (1.121)

9.19

few: impairment of memory, inability to concentrate, and numbness and tingling of lips and fingers with slight tremor. In advanced cases serious or total disability occurs: loss of muscle coordination, difficulty in articulating words, vision failure, and renal failure. Alkylmercury compounds are used to control fungus in agriculture. Microorganisms can convert inorganic forms of mercury to methylmercury. In waters where mercury occurs and fish feed, high concentrations of methyl mercury can be found in the fish. Ethyl and methylmercury compounds accumulate in all tissues, particularly the brain, and are excreted more slowly than are inorganic and aryl mercury compounds.

[19 references] SW

Veith, Gilman D., and George Fred Lee (Water Chem. Program, Univ. Wisconsin, Madison, Wis.)
Chemical Abstracts 77, No. 15, 97455c (Oct. 9, 1972)

9.19 PCBs [CHLOROBIPHENYLS] IN FISH FROM THE MILWAUKEE REGION

9.19

Brine and other aqueous solutions over pH range of 2 to 12 were treated. To minimize acid attack and to conserve the exchanger alloy, pH of 4.0 or more was acceptable. The metals that were successfully removed are silver, arsenic, gold, cadmium, copper, chromium, iron, mercury, lead, and zinc. Mercury was also removed from chlor-alkali brines.

[5 tables, 22 references] SW

Romashevskii, E. K. (Donskoi S.-Kh. Inst., Persianovka, U.S.S.R.)
Chemical Abstracts 77, No. 15, 97483k (Oct. 9. 1972)

9.19 ACTION OF A MERCURY PREPARATION ON CARP

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those subjected to accidental or deliberate release of concentrates? In the field, factors interact and a population increase or decline may be caused by one factor in one place and by another factor in another place or at another time. Furthermore, a sublethal effect may be critical in one case but not in another case. Each case must be considered on its merits; various examples are described.

The author believes that the extent to which a country can limit the use of persistent organochlorine insecticides depends on local conditions. Their use will be required in tropical countries for some time, but their withdrawal, total or partial, in nations in the temperate zone appears to be a wise precaution to protect natural resources. The real argument about organochlorine insecticides, the author states, is not whether one should prefer men to peregrines (Recent studies in Britain have shown that these falcons have been affected by the acute toxicity of the organochlorine pesticides.), but whether men should take serious note of what happened to peregrines as a result of using substances which are both valuable and at the same time dangerous to a wide range of organisms. FTP

Lemee, J. C., J. Ancellin, A. Vilquin (Dep. Prot. Sanit., Commis. Energ. At., Cherbourg, France)
Chemical Abstracts 77, No. 17, 111013r (Oct. 23, 1972)

9.19 CONTAMINATION OF SHRIMP (LEANDER SERRATUS) BY CESIUM-137 IN FOOD

9.19 ORGANOCHLORINE LEVELS IN ATLANTIC SEABIRDS

Bogan, J. A. (University of Glasgow, Dept. of Veterinary Pharmacology, Veterinary Hospital, Bearsden, Glasgow, G61 1QH, Scotland), and W. R. P. Bourne (The Seabird Group, Zoology Dept., Tillydrone Ave., Aberdeen AB9 2TN, Scotland)
Nature 240, No. 5380, 358 (Dec. 8, 1972)

The authors are reporting elsewhere [Mar. Pollut. Bull. (in press)] detailed data on the organochlorine levels in Atlantic seabirds occurring between Scotland and the Arctic; the present paper reports in a general way the results obtained. The Atlantic seabirds contained mainly PCBs and pp'-DDE, with the PCBs occurring in greater concentration in every bird. (This is in marked contrast to the North Pacific area where other workers found that the DDE levels were normally higher.) In the North Atlantic seabirds the ratio of PCB to DDE was between 2::1 and 10::1 in all species except the kittiwake (Rissa tridactyla) where the ratio was higher--in some kittiwakes as high as 60::1. Some data reported are as follows: Total organochlorine content of the muscle and liver of auks and shearwaters was between 0.1 and 1.0 p.p.m.; of kittiwake, fulmar, and British storm-petrel was between 1 and 10; and of large gulls and skuas was about 10. The stomach oil of a fulmar contained 1.3 p.p.m. of PCBs, the liver contained 1.5 p.p.m., the muscle 2.3 p.p.m., and the fat 42 p.p.m.

There were no substantial differences in the organochlorine content of birds from the north of Scotland, the Faroes, and the Barents Sea. The highest levels were found in glaucous gulls, Larus hyperboreus, breeding above the seabird colonies on the cliffs of Bear Island; normal birds had an average content of 24 p.p.m. of PCBs and 17 p.p.m. of DDE in the liver, and one bird had 535 p.p.m. of PCB and

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9.19 THE BIOLOGICAL PROPERTIES AND DISTRIBUTION OF MERCURY

Clarkson, T. W. (Medical School, University of Rochester, Rochester, NY 14620)
Biochemical Journal 130, No. 2, 61P-63P (Nov. 1972)

Mercury-containing compounds have high affinity for the thiol group (-SH). Since most proteins contain thiol groups that are metal reactive, and because thiol groups are important to most protein functions, mercury can disturb most functions involving enzymes.

Studies of the processes of mercury absorption, distribution, and excretion were conducted to determine the mechanism of transport and distribution. Results indicated that all mercury vapor in the lung was completely absorbed; in addition, after ingestion of methylmercury and phenylmercury compounds, gastrointestinal absorption was found to be in the range of 80 to 100%. Under similar conditions 15% or less of inorganic mercury, such as $HgCl_2$, was absorbed. Phenylmercuric acetate and $HgCl_2$ produce similar toxic effects in the kidney. Because of the difference in amounts absorbed, much lower dietary doses of the phenylmercury compound than $HgCl_2$ can cause damage. The much greater threat of mercury vapor to the central nervous system was shown by its complete absorption in the lungs; mercury content of brain after exposure to vapor was substantially higher than after exposure to inorganic mercury compounds.

The practically complete absorption of the short chain alkylmercury compounds (as methylmercury) from food, and their ability to cross cell membranes (as blood-brain and placental barriers) indicates the hazard to the central nervous system of animals from the fetal stage and on. The high absorption of methylmercury and

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9.19 (0.322) THE BIOLOGICAL ALKYLATION OF MERCURY

Landner, Lars (Swedish Water and Air Pollution Research Laboratory, Box 5607, S-114 86 Stockholm, Sweden)
Biochemical Journal 130, No. 2, 67P-69P (Nov. 1972)

Since much of mercury pollutants was found to be in the form of alkylmercury (such as methylmercury), studies were performed to determine the biochemical pathways of alkylation. Earlier work showed that a Clostridium species was capable of producing methylmercury on a substrate containing mercuric chloride ($HgCl_2$), cysteine, and vitamin B_{12}. No production of methylmercury occurred from medium containing mercuric sulfide (HgS). Anaerobic conditions in natural waters almost always indicate the presence of hydrogen sulfide (H_2S) which reacts with and binds available mercury as mercuric sulfide (HgS). Additional studies showed that mercury bound as HgS is very much less available for methylation than the mercuric ion Hg^{2+}. Furthermore, no methylmercury was found in mud and soil under strict anaerobic conditions.

In contrast, large amounts of methylmercury have been found in upper layers of lake sediments and in dredged, air-dried, mercury-containing sediments. The author concluded that the most important biomethylation of mercury is performed by aerobic organisms.

The pathways of methylation in aerobic microorganisms were found not to be by direct transmethylation. Rather, methylation of mercury appeared to be a detoxification reaction by mercuric ion resistant bacteria. Further findings

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9.19 (1.89) MIREX RESIDUES IN WILD POPULATIONS OF THE EDIBLE RED CRAWFISH (PROCAMBARUS CLARKI)

Markin, George P., Joseph H. Ford, and Joseph C. Hawthorne (U.S. Dept. of Agriculture, Plant Protection and Quarantine Programs, Gulfport, MI 39501)
Bulletin of Environmental Contamination and Toxicology 8, No. 6, 369-374 (Dec. 1972)

The rearing of the red crawfish in rice fields and ponds or trapping them in canals, bayous, and swamps is important industry in Louisiana. Crawfish are sensitive to many chlorinated hydrocarbon insecticides including DDT, dieldrin, and endrin; they are moderately sensitive to aldrin. Mirex is related to other chlorinated hydrocarbon insecticides, but it is totally chlorinated.

Mirex use is widespread in controlling the imported fire ant, an agricultural and human pest in Louisiana. Mirex bait is retailed to homeowners in bags containing 0.15% actual toxicant. Farmers use a 0.3% Mirex formulation.

Studies of Mirex toxicity on juvenile forms of two related crawfish indicated they were extremely susceptible and were capable of concentrating Mirex 27,210-fold from environmental water containing the insecticide.

The continued use of Mirex appeared to be a threat to the crawfish industry. To evaluate the problem, studies were undertaken to determine if Mirex residues in crawfish from Mirex-treated areas approach the levels found under laboratory conditions to be toxic. Crawfish were collected from ponds, canals, bayous, swamps, and other areas which had a history of Mirex bait use in pastures adjacent to the waters. The crawfish were washed, homogenized, and extracted with a hexane and isopropanol mixture. The treated extract was cleaned up in a florisil column

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9.19 (0.322)

indicated that detoxification involves one or more steps in the synthesis of methionine. Homocysteine is the last precursor in the stepwise synthesis of methionine; homocysteine is transformed, via methylation, into methionine. In the presence of mercury, the methyl group is not transferred to the homocysteine molecule but is transferred to the mercury atom. The author suggests that methylation of mercury may be regarded as an incorrect synthesis of methionine.

In regions of high mercury pollution the presence of mercury resistant bacteria has ecological consequences; the ability of these organisms to methylate mercury will increase the mobility of mercury in the sediment. This increase will cause higher concentrations of mercury to appear in water-living organisms at the end of the food chain.
[15 references]

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67 p.p.m. of DDE in the fat. The authors believe that it seems a matter for concern that such high levels of organochlorine compounds can now be found in the Arctic over 250 miles north of the mainland and in a species that never migrates far south, in an area where the surface sea water probably does not even originate in Europe, but in the western North Atlantic.
[8 references]

FTP

9.19 (1.89)

and concentrated by evaporation. Gas chromatography was used for analysis and identification of residues.

Field studies showed no massive population declines of crawfish. Most of the crawfish tested showed no detectable amounts of Mirex. Residues that were obtained were below levels capable of causing mortality (1 to 8 p.p.b.). The authors concluded that the use of Mirex in south-central Louisiana is not a threat to the crawfish industry.
[1 table, 10 references]

SW

9.19 EFFLUENT-FREE CHLORINE DIOXIDE GENERATING PLANT FOR PULP BLEACHING

Ishi, Genzo, Tadashi Shimomura (Japan Carlit Co., Ltd., Tokyo, Japan)
Chemical Abstracts 77, No. 26, 166351e (Dec. 25, 1972)

9.19 CONVERSION OF SOLID WASTE TO LIQUID FUEL

Weiss, Alvin H. (Dep. Chem. Eng., Worcester Polytech. Inst., Worcester, Mass.)
Chemical Abstracts 77, No. 26, 166359p (Dec. 25, 1972)

9.19 EFFECTS OF HYDROGEN SULFIDE ON FISH EGGS AND FRY

Smith, L. L., and D. M. Oseid (Dep. Entomol. Fish. Wildl., Univ. Minnesota, Minneapolis, Minn.)
Chemical Abstracts 77, No. 17, 110198t (Oct. 23, 1972)

9.19

phenylmercury compounds from foods may be due to the diffusibility and lipid solubility of the mercury atom. The chloride complexes of mercury, resulting from digestion of protein bound methylmercury, are also lipid soluble.

Metallothionein is a protein that may be important in protecting kidney tissue from damage by inorganic mercury compounds. This protein, which is high in thiol content, is present in the kidney in amounts sufficient to bind the amount of mercury associated with the onset of kidney damage. When the binding capacity of metallothionein is exceeded, damage to the kidney begins.

The formation of diffusible, mercury complexes with thiol compounds in the liver is an important process in the distribution of mercury--through the blood stream--to organs and tissues of the body.
[13 references]

SW

9.19 IMPACT ON ORGANOCHLORINE CONTAMINANTS ON PHYSIOLOGICAL FUNCTIONS IN FISH

Grant, Blake F., and Richard A. Schoettger (Fish-Pestic. Res. Lab., Columbia, Mo.)
Chemical Abstracts 77, No. 17, 110285u (Oct. 23, 1972)

9.2 FISHERIES COOPERATIVES: THEIR FORMATION AND OPERATION

Napoli, James J. (University of Rhode Island, Marine Advisory Service, Narragansett, RI 02882)
Marine Memorandum 30, Marine Advisory Service, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882 (1972), 18 pp. Price not given.

This article is a report of the proceedings of the Workshop on Fisheries Cooperatives held in Galilee, R.I., on June 6-7, 1972. The workshop was sponsored by the University of Rhode Island Marine Advisory Service. The subject areas covered are (1) the definition of a cooperative, (2) how to start a cooperative, (3) the problems of cooperatives, and (4) uniting cooperatives into regional organizations. The appendix contains information on the Farm Credit System (by Bruce Morehead) and a list of workshop participants. A cooperative provides an alternate system for carrying out business when the regular market system does not work. There are two general types of cooperatives--producer cooperatives and consumer cooperatives. The producer cooperatives, which better serve the fishermen, can perform the functions of marketing, supply, production, and bargaining. The key to the success of any cooperative is a competent cooperative manager.
[4 references]
FTP

9.3 REPORT OF THE WORKING GROUP ON INTRODUCTION OF NON-INDIGENOUS MARINE ORGANISMS

Anonymous
Cooperative Research Reports No. 32, 59 pp. (Nov. 1972) (International Council for the Exploration of the Sea, Charlottenlund Slot, DK-2920, Charlottenlund, Denmark)

This report covers the advantages and complications of introducing and domesticating animals not native to an area. The benefits derived from these introductions are well known, but the associated pests and diseases that accompanied the new comers have caused many intractable problems.

Careful consideration needs to be given to proposals for introduction of new animals, and guidelines should be developed to aid reaching decisions. To assist in this task the International Council for the Exploration of the Sea setup a working party to investigate the procedures necessary to be followed in the introduction of nonindigenous organisms.

The recommendation of the working party is that national legislation should be enacted which prohibits the importation of marine organisms except under license. The license procedure would exercise all activities that would safeguard the existing ecosystems against unwise introductions.

A 12-page bibliography on the subject of introduced organisms is given. In addition, a sample questionnaire is provided for possible development into a record-keeping system for use in international control of introductions. SW

9.2 A PENETRATION OF THE TECHNOLOGICAL FORECASTING JUNGLE

Lanford, H. W. (Dept. of Management, School of Business and Administration, Wright State University, Dayton, OH 45431)
Technological Forecasting and Social Change 4, No. 2, 207-225 (1972)

In this article, the author discusses some of the difficulties facing technological forecasters today. He defines the various methodologies. In spite of the difficulties involved in technological forecasting, it is increasing in use as a valuable tool for planners. Nevertheless, technological forecasting has a long way to go to achieve its full capacity as a decision aid to planners. In a recent survey, other workers found that technological forecasting was a relatively important input to formal planning in research in only 50% of the companies reporting (in engineering 28%, in marketing 15%, and in manufacturing 25% of the companies reporting). Technological forecasting has the capability to assist managers, decision makers, and planners to a much greater degree.
[5 figures, 21 references]
FTP

9.3 THE SPECIES APPROACH: A SOLUTION TO LAW OF THE SEA

Weddig, Lee J. (National Fisheries Institute, Washington, D.C.)
Fishing Gazette 90, No. 1, 15-17, 32 (Jan. 1973)

The jurisdiction that governments seek to maintain over the ocean are limited to geographical boundaries, although the fish stocks they wish to control may occupy the areas so controlled only seasonally. Developing nations are in favor of extended jurisdiction (200-mile limit) over the adjacent seas while nations with distant water fishing fleets oppose extended jurisdiction. Similar opposing views exist among segments of the U.S. fishing industry. The New England segment would be improved, members believe, by the imposition of a 200-mile limit to protect their inshore fishery from damage by foreign trawlers. Southern California tuna fishermen, on the other hand, oppose such a limit, believing that if it were imposed everywhere their distant water fishing prospects would be damaged.

The essential feature of the species approach is the necessary regulation required to give a species the capability of perpetuating itself. In addition, the species approach recognizes economic rights and management rights of coastal nations to harvest stocks adjacent to their coasts. If the fishermen of these nations underharvest the stocks, provisions would be made for other nation's fishermen to complete the harvestable quota. The nation in which anadromous fish spawn would manage them and have preferential harvest rights beyond the territorial sea to the limits of their migratory range. When the fish are harvestable in the territorial waters of other nations, all the nations involved would be required to share the catch consistent with conservation and the rights of each nation. For
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9.2 AN EVALUATION OF THE FORECASTING OF INFORMATION PROCESSING TECHNOLOGY AND APPLICATIONS

Grabbe, Eugene M. (State Center for Science Policy and Technology Assessment, Dept. of Planning and Economic Development, Honolulu, Hawaii), and Donald L. Pyke (Academic Planning, University of Southern California)
Technological Forecasting and Social Change 4, No. 2, 143-150 (1972)

Comprehensive technological forecasting is a tool used to provide answers to four questions: (1) What trends are operative in the technology in question? (2) What are the alternatives, if any? (3) What is the nature and extent of the effort involved to reach each alternative?, and (4) How do the alternatives and their related efforts compare? This article describes the approaches used in modern technological forecasting and discusses several forecasts that concern information processing. The events that were anticipated during the years 1968 to 1972 are evaluated against the occurrence of the events, and forecasts for the future are compared. Also, the future role of the computer in technological forecasting is discussed.

The results suggest that information processing technology and applications are advancing more rapidly than predicted by the forecasts. Various long-range forecasts on information processing are in general agreement. The computer will increase in importance in future forecasts as a subject and a tool for processing and forecasting data.

[5 tables, 11 references] FTP

9.3

fish of ocean origin that are migratory, such as tuna, the management of such species would be the responsibility of multinational control.

The U.S. Government submitted draft articles during the second preparatory session of the Law of the Sea Conference in which the species approach was recognized. At the third preparatory session in March 1972, a representative of the United States indicated a willingness to accept the concepts of the species approach. This position was presented as a draft article in the fourth preparatory session in August 1972.

The author suggests that the species approach will protect the interests of the U.S. industry. Only a small number of nations have supported the species approach. However, there are two more preparatory sessions scheduled prior to the opening of the Law of the Sea Conference in 1974. The U.S. position on species approach may bring the extreme contrary views of the developing nations and the distant water fishing nations to a compromise position. SW

9.2 FISHERIES STATISTICS OF THE PHILIPPINES 1970
(1.0157)

Prepared by the Economics and Statistics Section, Fisheries Information Division of the Philippine Fisheries Commission
Philippine Fisheries Commission, Fisheries Information Division, Dept. of Agriculture and Natural Resources, Manila, Philippines (n.d.), 118 pp.

These fishery data are for the 5-year period 1966 to 1970. The data are presented in the form of 34 tables and three appendices.

The first major subjects tabulate quantity and value of fish produced between 1951 and 1970; fish production for the 5-year period; the nutritional requirements and deficits of fish production; and fish consumption.

The second major subject tabulates aspects of commercial fishing vessels: numbers (powered and unpowered); production by kind of vessel, gear used, kind of fish, fishing ground, and time of year.

The third major subject tabulated is fishponds in operation and available for development.

Foreign trade is tabulated under exports, by kind, quantity, value, and destination.

Gathered fishery products are the last subjects tabulated. Kind, quantity, and value are shown. Fishery products in domestic trade are also listed.

The appendices list the fishery regions, fishing grounds frequented by fishing vessels, and forms used in collecting information on the industry.

[34 tables, 3 appendices] SW

9.3 THE 1973 LAW OF THE SEA CONFERENCE: SIGNIFICANT ISSUES

Lumb, R. D. (University of Queensland, Australia)
University of Queensland Law Journal 7, No. 2, 256-279 (Dec. 1971)

Some of the articles of the existing Conventions on the Law of the Sea that are in need of revision are article 1 of the Convention on the Territorial Sea and Contiguous Zone (does not specify the breadth of the territorial sea), articles 4-7 concerning the demarcation of internal waters, articles 14-17 dealing with the right of innocent passage, and article 24 concerning the contiguous zone. Some revision of article 1 (definition of continental shelf) will be necessary if the international regime makes provision for an area of international jurisdiction incompatible with this definition. Also, certain articles of the Convention on Fishing and Conservation of the Living Resources of the High Seas will have to be reexamined to determine whether they provide adequate protection to the interests of coastal states in conserving fishery resources in adjacent waters. The present paper contains a discussion of each these matters.

[134 footnotes] FTP

9.3 PUBLIC RIGHTS AND COASTAL ZONE MANAGEMENT

Schoenbaum, Thomas J. (School of Law, University of North Carolina)
North Carolina Law Review 51, No. 1, 1-41 (Nov. 1972) Sea Grant Publication UNC-SG-72-13 (Reprint)

Because of the pressure of various, and often conflicting, use patterns, legal and institutional innovations are needed to protect our estuarine and coastal resources. In this article the author examines the principal legal aspects of coastal zone resource management. He reviews the present law relating to public rights in the lands and waters of the coastal zone and existing patterns of legislation for coastal resource presentation. Then, he offers suggestions for the creation of a coastal zone management agency and the development of a plan for managing coastal resources. The discussion is centered on the law of one particular jurisdiction, the State of North Carolina, but the principles developed may be applied by analogy to other coastal states.

Land and water use planning for the purpose of protecting resources, the author indicates, is a new departure for U.S. law and presents new challenges. The unique character of the coastal zones of this country, make them an appropriate area to begin the construction of a management program. New coastal zone legislation should consider the substantial rights of the public under traditional legal principles; such rights have been poorly enforced in the past. A coastal zone agency should be created to manage the coastal area so as not to exceed the environmental limits of development; it must not be constructed according to the tradiational model of the specialized, regulatory administrative agency. The agency should have planning and regulatory functions, with broad powers in many different areas.

(over)

1.0114 (9.6)(9.12) GUIDE TO THE COASTAL MARINE FISHES OF CALIFORNIA

Miller, Daniel J., and Robert N. Lea
Fish Bulletin 157, 235 pp. (1972) (Dept. of Fish and Game, State of California)
Obtained from: Office of Procurement, Documents Section, P.O. Box 20191, Sacramento, CA 95820.

This guide contains comprehensive information on identification of 554 shallow marine species within California waters. All but three have been recorded as occurring in an area between the borders of Mexico and Oregon and offshore to at least 50 miles. Keys are shown for all the larger families with an outline illustration containing diagnostic features. All but eight species are shown in illustrations. An illustrated glossary is included which facilitates use of identification keys and species description.

Original data include a ventral sensory pore pattern key for the skates, 170 geographic range limit extensions, and several depth range and maximum size records. The family keys, where applicable, incorporate recent changes in taxonomy and terminology. SW

9.3 ISSUES RAISED BY THE ATTACHMENT OF THE SULEYMAN STALSKIY: SOVEREIGN IMMUNITY OF SOCIALIST FISHING VESSELS AND LIABILITY FOR DAMAGE TO FIXED FISHING GEAR BY VESSELS FISHING MOBILE GEAR

Windley, David W. (International Activities Staff, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Washington, D.C.), and Carmen J. Blondin (Office of the Chief Counsel, U.S. Coast Guard, Washington, D.C.)
Journal of Maritime Law and Commerce 4, No. 1, 141-157 (Oct. 1972)

A lobster fishing company in Massachusetts lost many of its lobster fishing pots in the offshore fishery resulting from trawling activities of foreign fishing vessels. After failing to obtain relief through diplomatic channels the company brought suit against the U.S.S.R. on June 10, 1971 in the U.S. District Court for the Northern District of California in San Francisco, Calif. The complaint cited the owners of 23 trawlers and other fishing vessels operating in the same fleets known as U.S.S.R. The complaint also indicated that the defendent was not to be found within the jurisdiction of the court, and sought attachment of the Soviet Union freighter Suleyman Stalskiy (then at dock in San Francisco). Eventually a negotiated settlement was arranged. Thus, the decision on the merits of the case was never reached. The authors believe that the outcome of the case could have presented several interesting facets because of the various legal issues involved, namely, negligence, sovereign immunity, liability for damage to fixed gear, status of Socialist "entities" as private parties. The present article is a review of two of the most salient aspects of the case; (1) the sovereign immunity of Soviet Union fishing vessels and (2) liability for damage to fixed gear by vessels fishing mobile gear on the high seas. [78 footnotes] FTP

1.8 (9.6) KINGDOM OF THE SEASHELL

Abbott, R. Tucker (Delaware Museum of Natural History)
Published by Crown Publishers, Inc., New York (1972), 256 pp. Price not given.

This book defines the mollusc and its six classes--Gastropoda, the best known, consisting of the conches, welks, and snails; Bivalvia, the most important economically, contains the clams, oysters, and scallops; Cephelopoda, with the suprising grouping of squids, octupuses, and nautiluses--and three minor classes--Scaphoda (looks like a miniature elephant tusk); Amphineura (snaillike, also called chitons); and Gastroverms, a primitive, segmented, limpetlike shell.

The book contains chapters on the biology of molluscs: where and how they live, geographic locations, habits, and evolution. There are also interesting chapters on seashells: collectors and collections, response of man through the ages, commercial uses, and applications in art, jewelry, and science. Additionally, a guide to seashell literature and many full color illustrations are included. SW

9.3 GENERAL ASSEMBLY SETS SCHEDULE FOR CONFERENCE ON LAW OF THE SEA

Stevenson, John R. (U.S. Department of State, Washington, D.C.)
Department of State Bulletin 68, No. 1753, 113-116 (Jan. 29, 1973)

This article contains the statements by John R. Stevenson, Legal Adviser of the Department of State and U.S. Representative to the U.N. Seabed Committee, made in Committee I (Political and Security) of the U.N. General Assembly on November 28 and December 7, together with the text of a resolution adopted by Committee I on December 7 and by the Assembly on December 18.

In the resolution, the General Assembly requests the Committee on Peaceful Uses of the Sea-Bed and the Ocean Floor beyond the Limits of National Jurisdiction to hold two further sessions in 1973, one of five weeks at New York, beginning in early March, and the other of eight weeks at Geneva, beginning in early July, with a view to completing its preparatory work, and to submit a report with recommendations to the General Assembly at its 28th session. It requests the General Assembly to convene the first session of the Third United Nations Conference on the Law of the Sea at New York for a period of about two weeks in November/December 1973, for the purpose of dealing with organizational matters (election of officers, adoption of the agenda and rules of procedure of the Conference, establishment of subsidiary organs).

[It] decides to convene the second session of the Conference, for the purpose of dealing with substantive work, at Santiago, Chile, in April/May 1974, for a period of eight weeks, and such subsequent sessions, if necessary, as may be decided by the Conference and approved by the General Assembly, ...

[2 footnotes] Partly modified; partly reprinted

9.19 (9.6) A GUIDE TO MARINE POLLUTION

Goldberg, Edward D. (Scripps Institution of Oceanology, La Jolla, Calif.) (compiler)
Published by Gordon and Breach Science Publishers, Inc., 440 Park Ave., S. New York, NY 10016 (Copyright 1972 by the FAO), 168 pp. Price not given.

This book is based on reports made at the Seminar on Methods of Detection, Measurement and Monitoring of Pollutants in the Marine Environment, organized by the Food and Agricultural Organization of the United Nations, and held in Rome, Italy, December 4-10, 1970.

The chapters are as follows. "Halogenated Hydrocarbons." This chapter is mainly concerned with methods of analysis. "Petroleum." This pollutant and the extent of its worldwide distribution are defined in water, sediments, and organisms. "Inorganic Chemicals." The chief subject of this chapter is metals in sea water and their source. "Organic Chemicals." These pollutants, naturally occurring and man added, are defined in detail.

"Nutrient Chemicals." This chapter contains information on compounds containing nitrogen and phosphorus, such as ammonia, nitrates, and phosphates. They promote eutrophication. "Suspended Solids." This chapter contains a description of sewage pollution. "Radioactivity." This chapter covers the extent of current pollution and gives a prediction of the future burden.

"Test Organisms." Bioassay for detection and evaluation of pollution is described. "Design of a World Monitoring System." The concept of a single world environment with the need to monitor its condition is described in this chapter. Each chapter also contains analytical methods and references. SW

9.3

The appendix is a copy of a bill entitled "A Bill To Be Entitled an Act Relating to Management of the Coastal Zone of North Carolina."

[206 footnotes, 1 appendix] FTP

9.6 MONTEREY BAY BIBLIOGRAPHY. SUPPLEMENT NUMBER ONE

Baron, Doris (compiler) (Moss Landing Laboratories, P.O. Box 223, Moss Landing, CA 95039)
Technical Publication 72-8, Moss Landing Marine Laboratories of the California State University at Fresno, Hayward, Sacramento, San Francisco, and San Jose, California (1972), 92 pp.

The main geographical area covered by the bibliography is the central California coast from Morro Bay to Tomales Bay.

The bibliography is partial and provisional. It covers geology, physical geography, and oceanography; additional subjects include meteorology, botany, and zoology. Other subjects include fisheries and fish culture. Scientific and general papers, books, and reports are listed, including miscellaneous publications. SW

9.6 NEW BOOKS

Gerecht, J. F. (reviewer)
Marine Chemistry, vol. 1
Martin, Dean F.
Published by Marcel Dekker, Inc., New York (1972), 389 pp. Price $9.75.
Journal of the American Oil Chemists' Society 50, No. 1, 7A, 13A (Jan. 1973)

This 1972 edition is a revision of the 280-page volume published in 1968. The book is devoted almost exclusively to analytical techniques used in marine chemistry. The book contains 35 chapters. It is divided into five sections as follows: I. Basic Contents and Methods (101 pp.); II. Analysis of Selected Micronutrients and Related Compounds (112 pp.); III. Other Spectroscopic Techniques (43 pp.); IV. Analysis of Polluted Waters (82 pp.); and V. Analysis of Sediments and Selected Organic Matter (34 pp.). FTP

7.0 (9.6) MANUAL OF ANALYTICAL TOXICOLOGY

Sunshine, I. (editor)
Chemical Rubber Co., 18901 Cranwood Parkway, Cleveland, OH 44128 (1971), 393 pp. Price $15.00.
B. L. Oser (Food and Drug Research Laboratories, Inc., Maspeth, NY 11378) (reviewer)
Food Technology 27, No. 2, 90 (Feb. 1973)

This book is a collection of concise descriptions of tests for the detection and determination in biological fluids and tissues of about 75 chemicals (drugs, pesticides, and other organic and inorganic toxicants commonly encountered in cases of clinical poisoning). FTP

7.45 AUTOMATIC DETERMINATION OF NITRITE NITROGEN AND NITRATE NITROGEN IN WATER AND SEWAGE [AUTOMATYCZNE OZNACZANIE AZOTU AZOTYNOWEGI I AZOTANOWEGO W WODACH I ŚCIEKACH]

Wudzińska, I., and A. Ponikowska
Gaz, Woda i Technika Sanitarna. No. 6, 207-211 (1971) (In Polish)
Polish Technical and Economics Abstracts NR1(85), 78 (1972) [Published by Centrum Informacji Naukowej Technicznej i Ekonomicznej, Warszawa, Al. Niepodległości 186, Poland]

This article is a discussion of the conditions of analysis for nitrite and nitrate nitrogen in samples of surface water as established by the Water Protection Establishment of the Institute of Water Control and Exploitation. The method is suitable for the analysis of undiluted samples containing nitrate nitrogen in the amount up to 5 mg./l. (thus levels encountered in surface waters can be determined). [8 figures, 3 tables] FTP

9.6 RHODE ISLAND MARINE BIBLIOGRAPHY

Anonymous
University of Rhode Island Marine Technical Report Number 3, 192 pp. (n.d.), Marine Advisory Service, Narragansett Bay Campus, Narragansett, RI 02882. Price $5.00.

The geographic areas covered by the bibliography are the tidal waters of Rhode Island, the outer limits being defined by a line from the Connecticut border through Fishers Island and Plum Island to Orient Point, then to Gardiners Island, Montauk Point, Block Island, Nomans Land, Gay Head, Cuttyhunk Island, and to the Massachusetts border.

The subjects covered include marine-related fields in biology, physics, chemistry, recreation, industry, and fisheries.

The types of publications listed include publicity, books, newspaper articles, films, journal articles, reports, studies, and letters. SW

9.7 (9.1) THE ENVIRONMENT FILM REVIEW. A CRITICAL GUIDE TO ECOLOGY FILMS

Anonymous
Environment Information Center Inc., 124 East 39th St., New York, NY 10016 (1972), 156 pp. Price $20.00.
G. N. Anderson (reviewer)
Food Technology 27, No. 2, 90 (Feb. 1973)

This review contains indexes and critiques of 627 environmental films. The films cover 21 categories: air pollution, chemical and biological contamination, energy, environmental education, environmental design and urban ecology, food and drugs, general, international, land use and misuse, noise pollution, nonrenewable resources, ocean and estuaries, population planning and control, radiological contamination, renewable resources-terrestrial, renewable resources-water, solid waste, transportation, water pollution, weather modification and geophysical change, and wildlife.

Ths list is intended to provide film users with a discriminating reference for selection of films according to subject covered, treatment, and ecological objectivity. FTP

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Grant, Blake F.	24	9.19
Greguss, Akos (pat.)	6	2.3
Halstensen, H. (pat.)	10	3.63
Harkey, C. N. (pat.)	6	2.3
Harrington, David L.	7	2.1121
Harriss, Robert C.	19	9.19
Hashimoto, Keizo	11	4.13
Hassine, Oum Kalthoum Ben	18	9.13
Hawthorne, Joseph C.	23	9.19
Heaton, E. K.	5	2.08
Henick, A. S.	13	4.61
Heurtebise, M.	14	7.42
Hibino, Susumu	19	9.14
Higgins, James	7	2.1121
Hirose, Keiji	18	9.1
Holliday, D. V.	17	9.10
Holsinger, V. H.	13	6.54
Hottenroth, Beatrix	10	3.338
Hov, H. (pat.)	10	3.63
Ikekawa, Nobuo	12	4.13
Inoue, Taisei (pat.)	8	2.1127
Ishi, Genzo	24	9.19
Ishihara, Tadashi	2	0.38
Jangaard, P. M.	13	6.137
Jensen, S.	19	9.19
Jonsson, G. (pat.)	7	2.3
Kajita, Masanao	19	9.14
Kanazawa, Akio	1	0.35
--	11	4.13
Ke, P. J.	13	6.137
Kerby, Catherine (ed.)	20	9.17
Kenyon, A. J.	2	0.5
Kitamikado, Manabu	1	0.38
Kittredge, J. S.	3	0.4
Konosu, Shoji	15	8.51
Kopp, John F.	15	7.42
Kumta, U. S.	10	3.15
Kurukawa, Kensuke	2	0.5
Landner, Lars	23	9.19
Lanford, H. W.	25	9.2
Lea, Robert N.	27	1.0114
Learson, Robert J.	9	3.33
Lee, George Fred	22	9.19
Lemee, J. C.	22	9.19
Leslie, R. C.	14	7.0
Lobring, Harry B.	15	7.42
Longbottom, Mary C.	15	7.42
Lopez, C.	2	0.5
Loury, M.	11	4.5
Lubkowitz, J.	14	7.42
Luk'yanenko, V. I.	20	9.19
Lumb, R. D.	26	9.3
Lunde, Gulbrand	16	7.42
--	16	8.59
Maamouri, Kalthoum	18	9.13
Markin, George P.	23	9.19
Martin, Dean F.	28	9.6
Mason, Arthur D.	13	7.42
Mason, James	5	1.88
Matsui, Masami	12	4.13
Matsumoto, J. (pat.)	10	3.12
Matsuno, Takao	11	4.13
McErlean, Andrew J. (ed.)	20	9.17
McKaveney, James P.	21	9.19
Mencacci, S. A. (pat.)	10	3.33
Miller, Daniel J.	27	1.0114
Misra, K. C.	14	7.51
Miyazaki, Yoshio	8	2.1471
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Moore, Stanley A., Jr.	19	9.19
Morooka, Hitoshi	2	0.38
Murata, Hisashi	17	9.13
Nagata, Seiichi	11	4.13
Napoli, James J.	25	9.2
Nicholson, William R.	17	9.12
O'Brien, W. John	21	9.19
Olsson, M.	19	9.19
Ondrias, John C.	18	9.12
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Oser, B. L. (reviewer)	29	7.0
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Porter, Eleanor (ed.)	1	0.4
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Renberg, L.	19	9.19
Ritchey, Charles	13	7.42
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Saila, Saul B.	7	2.14
Saroj, K. K.	14	7.51
Schoenbaum, Thomas J.	27	9.3
Schoettger, Richard A.	24	9.19
Schultz, R. Jack	18	9.10
Shen, Shin-Chieh	5	1.0152
Shimomura, Tadashi	24	9.19
Smetherman, Bobbie B.	4	1.013
Smetherman, Robert M.	4	1.013
Smith, Elizabeth Miremont	1	0.4
Smith, K. L., Jr.	17	9.11
Smith, L. L.	24	9.19
Smith, R. W.	3	0.8
Spitzer, Mary E.	13	7.42
Sreenivasan, A.	10	3.15
Stevenson, John R.	28	9.3
Stivers, David A.	21	9.19
Stoner, J.	18	9.11
Sunshine, I. (ed.)	29	7.0
Takahashi, F. T.	3	0.4
Teal, J. M.	17	9.11
Teshima, Shin-ichi	1	0.35
--	11	4.13
Thompson, P. F.	12	4.14
Ting, Wai-Hwa	5	1.0152
Tinker, Burton L.	9	3.33
Tonjes, Stephen Dodd	20	9.19
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Wass, Marvin L. (ed.)	20	9.17
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Willaims, Cecil E.	7	2.14
Windley, David W.	27	9.3
Wójcik, T.	7	2.119
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Yamada, Masaru	2	0.5
Yamamoto, Hiroshi	1	0.38
Yasuda, Masato	2	0.38
Yoshida, Tamao	12	4.13
Zenro, Minami	19	9.14

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